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U.S. Department of the Interior
Bureau of Land Management

Final

Oregon State Office

December 1985

Northwest Area Noxious Weed Control Program

Environmental Impact Statement

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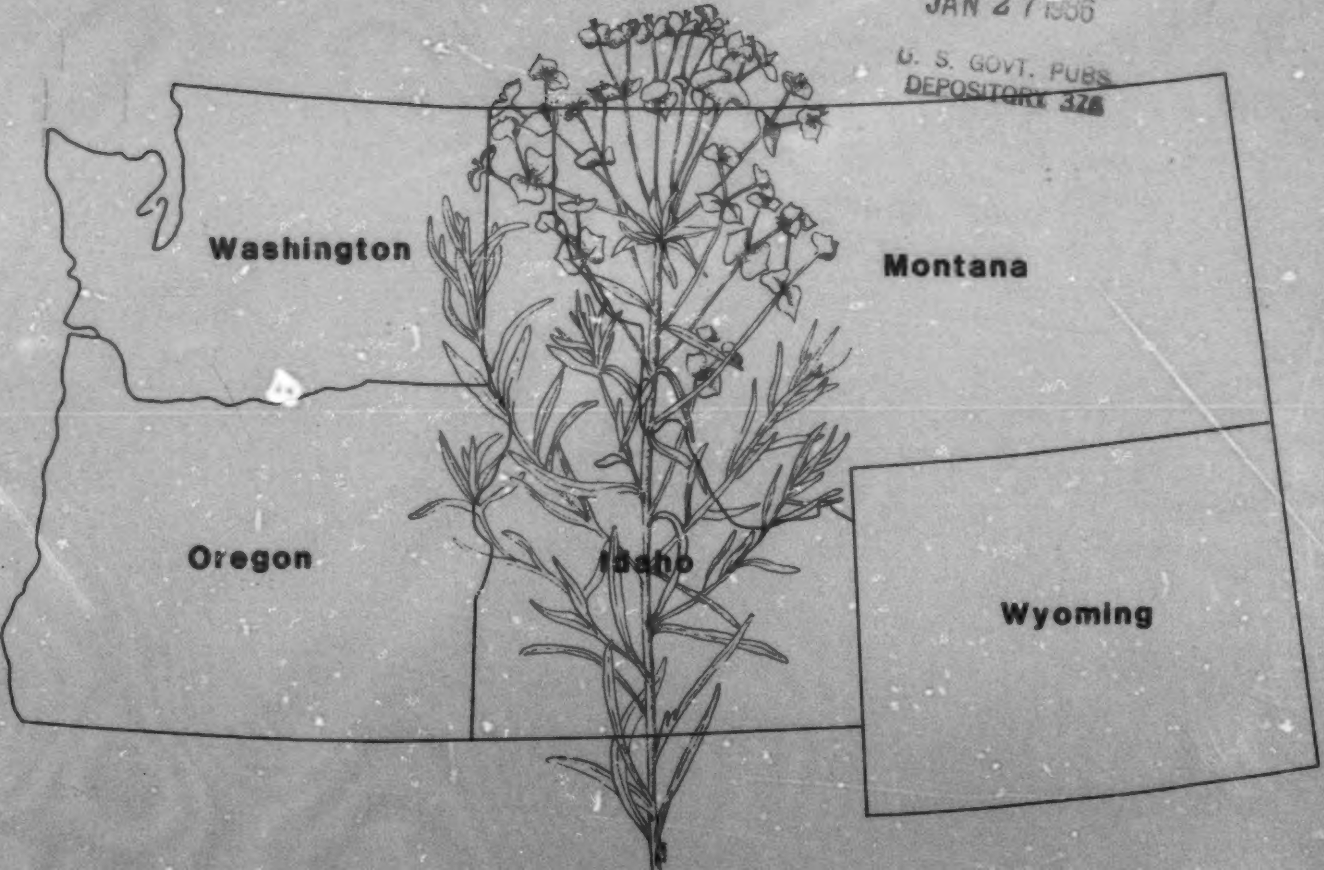
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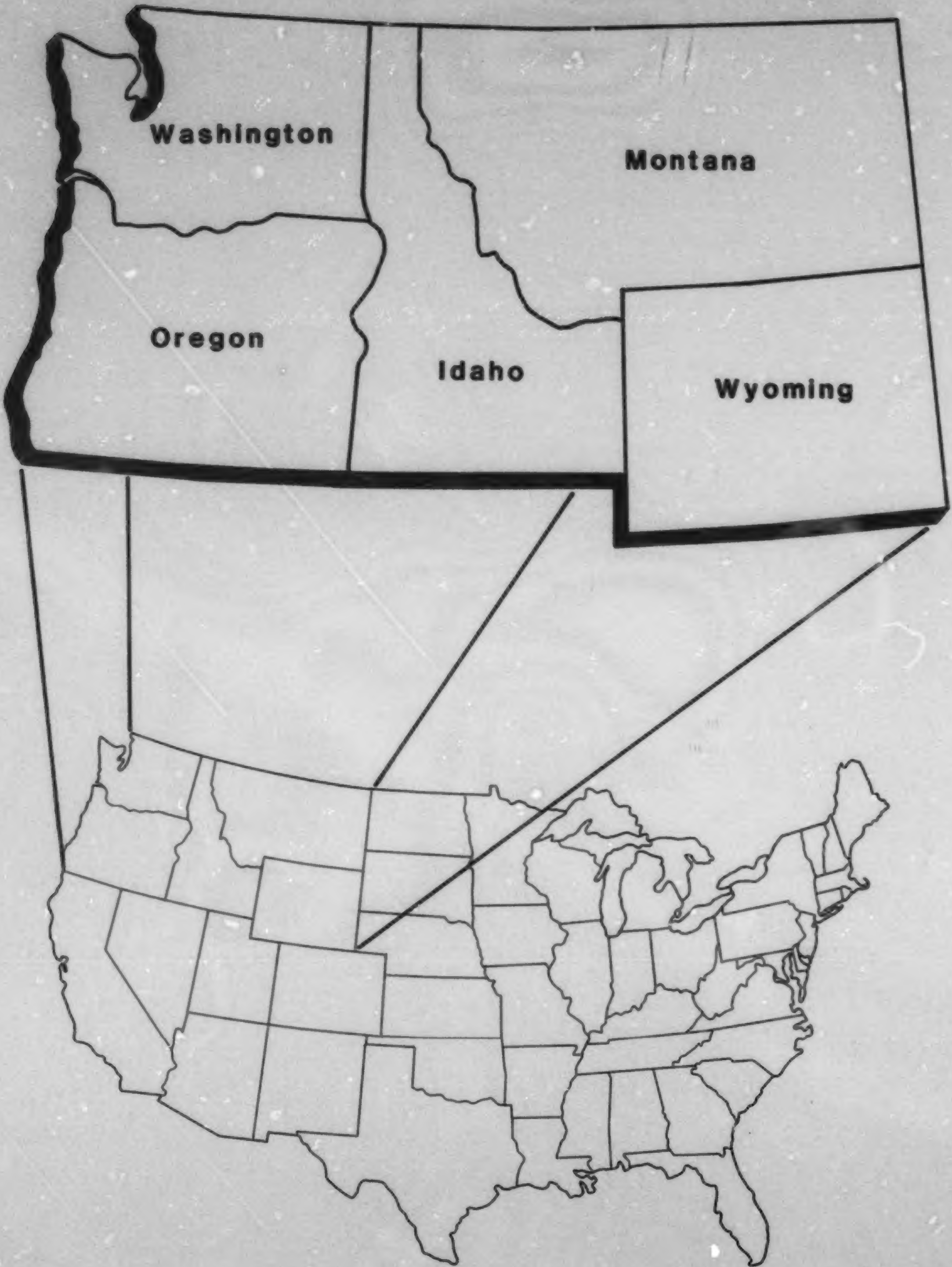
General Location Map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BUREAU OF LAND MANAGEMENT

OREGON STATE OFFICE
P.O. Box 2965 (825 NE Multnomah Street)
Portland, Oregon 97208

This is the Final Environmental Impact Statement (EIS) for noxious weed control in five northwestern states (Idaho, Montana, Oregon, Washington and Wyoming.) The statement analyzes the impacts that would result from the Proposed Action and three alternatives. The purpose of the statement is to disclose the probable environmental impacts and to assure that these impacts are considered along with economic, technical, and other factors in the decisionmaking process. In using this analysis, readers should keep in mind that the EIS (draft or final) is not a decision document.

The analysis provided here has been refined and updated as a result of public comment, peer review, and internal review of the Draft EIS. Seventy-two letters were received during the Draft EIS comment period. All are printed in the Final EIS, along with our responses.

Comments received on this Final EIS as well as those received after the close of the comment period on the Draft EIS will be considered in the decision process. Decisions will be prepared and issued after February 15, 1986.

Thank you for your past and future assistance in our efforts to manage public lands in the best interests of all concerned.

Sincerely,

William G. Leavell
State Director, Oregon and
Washington

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Final

Northwest Area Noxious Weed Control Program

Environmental Impact Statement

Prepared by

U.S. Department of the Interior
Bureau of Land Management
December 1985

State Director, Oregon State Office

Proposed Northwest Area Noxious Weed Control Program

Draft ( ) Final (x) Environmental Impact Statement

U.S. Department of the Interior, Bureau of Land Management

1. **Type of Action:** Administrative (x) Legislative ( )

2. **Abstract:** This EIS describes and analyzes the environmental impacts of implementing the proposed five-state program for the control of noxious weeds. A worst-case analysis of the impacts of herbicide use on human health is included.

The most effective and efficient suppression methods are proposed for use to adequately control noxious weeds. These weeds are reducing public rangeland productivity, spreading to nearby noninfested lands, and increasing the economic burden on private landowners and state and federal taxpayers. The alternatives analyzed include 1) the Proposed Action, 2) No Aerial Herbicide Application, 3) No Herbicide Use, and 4) No Action. Alternative 1 is the preferred alternative. Significant environmental impacts of the preferred alternative include increased productivity of public land and the elimination of BLM land as a noxious weed seed source for the further infestation of nearby nonpublic land. Important environmental and resource values would be protected from adverse effects.

3. The draft statement was filed with the Environmental Protection Agency (EPA) and made available to the public on May 30, 1985.

4. **For further information contact:**

R. Gregg Simmons
EIS Team Leader
BLM Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

Telephone (503) 231-6272

Summary

This environmental impact statement (EIS) describes and analyzes the environmental impacts of implementing a program for controlling noxious weeds on public lands administered by the Bureau of Land Management (BLM) in the states of Idaho, Montana, Oregon, Washington, and Wyoming. In accordance with the National Environmental Policy Act, this EIS identifies impacts on the natural and human environment of four alternatives. Alternative 1, the Proposed Action, is the preferred alternative.

Alternatives

The proposed program for controlling noxious weeds would involve coordination with the states, counties, and private landowners to ensure that safety factors are adequate. Chemical, manual, mechanical, and biological methods of control are considered for use under two alternatives. The analysis makes assumptions that may oversimplify what would actually happen. For example, the analysis assumes the use of a maximum expected application rate for each herbicide, whereas the actual rate would be much lower and would depend on weed species, time of year, application method, number of applications, and formulation of herbicide. Treatment levels for the Proposed Action attempt to conform to individual state program goals for noxious weed control on BLM-administered lands. Treatment levels under Alternatives 2 and 3 would be somewhat less, and Alternative 4 would provide no attempt to control noxious weeds.

Alternative 1--Proposed Action. All approved methods of noxious weed control could be used in an integrated program. Average annual treatments throughout the EIS area would typically involve 21,200 acres of herbicide treatment, 300 acres of manual treatment, 800 acres of mechanical treatment, and 21,695 acres of biological treatment. All safety requirements and project design features would be followed in accordance with BLM policy and EPA registration restrictions.

Alternative 2--No Aerial Application of Herbicides. This alternative would be similar to the Proposed Action except no aerial application of herbicides would be allowed. Average annual treatments would typically involve 17,953 acres of chemical treatment, 300 acres of manual treatment, 900 acres of mechanical treatment, and 21,840 acres of biological treatment.

Alternative 3--No Use of Herbicides. Alternative 3 would not allow the use of herbicides, but all other treatments would be used. Average annual treatments would typically include 4,080 acres of manual treatment, 2,200 acres of mechanical treatment, and 21,950 acres of biological treatment.

Alternative 4--No Action. Under Alternative 4, no attempt would be made to control noxious weeds. Any control would only be a natural function of the environment with no planned intervention by land management actions.

Environmental Consequences

Air Quality. The major impacts on air quality would be slight increases in particulates and possibly visible smoke intrusions from weed burning. Particulate levels from burning under all alternatives, would not exceed the federal and state air quality standards for particulate concentrations. Some areas could be affected by relatively brief visible smoke intrusions under all alternatives except alternative 4. The likelihood of such an occurrence, however, would be extremely low because so few acres are proposed for burning.

Soils. Under Alternatives 1, 2, and 3, burning would result in a short-term loss of soil organic matter, microorganisms, and nutrients by leaching. Both burning and tilling would result in short-term, slight increases in erosion. The persistence of herbicides in soils under Alternatives 1 and 2 would be greater in the more arid portions of the EIS area.

Water Resources. The potential for herbicides to affect the quality of surface water is greatest under Alternative 1 with decreased amounts under Alternative 2. Alternatives 3 and 4 would not add herbicides to detectable background levels occurring in some streams from other sources. With the mitigation provided by design features such as buffer strips, suspended sediment and total dissolved solids are not expected to significantly increase. Ground water would not be affected under any alternative.

Vegetation. Alternative 1 would improve the ecological condition of rangelands and reduce the spread of noxious weeds to noninfested lands. Alternative 2 would have impacts similar to those of Alternative 1 except in areas accessible only to aerial herbicide treatment. In these areas, weeds would continue to spread. Alternative 4 would allow noxious weeds to spread unchecked. The spread of noxious weeds in turn would result in (1) a decline in rangeland ecological condition and (2) the infestation of adjacent lands, contributing to a decline in productivity. Alternative 3 would result in impacts similar to those of Alternative 4 where manual, mechanical, and biological methods do not control noxious weeds.

Animals. Alternatives 1 and 2 would benefit livestock and wild horses by increasing the amount of available forage and reducing the number of toxic plants in treatment areas. Alternative 4 would harm livestock and wild horses by allowing available forage to decrease and toxic plants to increase.

Alternatives 1 and 2 would have slightly adverse short-term impacts on wildlife that use proposed treatment areas by resulting in the loss of target and nontarget vegetation used for food and cover. However, higher quality habitat would occur after treatment. In the long term, however, these alternatives would benefit wildlife, especially big game, by increasing available forage. Alternative 4 would harm wildlife, particularly big game, by allowing the amount of available forage to decrease and would reduce wildlife diversity. Alternative 3 would affect wildlife much as would Alternative 4 where nonchemical control measures did not adequately control noxious weeds. Game fish populations would not be adversely affected by any alternative.

Cultural Resources. Appropriate measures would be taken to identify and protect cultural sites before ground-disturbing activities under Alternatives 1, 2, and 3. Undiscovered cultural sites would be susceptible to damage, but once a site is found, measures would be taken to reduce or avoid damage. Under all alternatives, sites found before disturbance would be managed to protect significant scientific and interpretive values.

Visual Resources and Recreation. Scenic degradation would be low to nonexistent under all alternatives. Alternatives 1 and 2 would benefit recreation areas infested with noxious weeds by decreasing visitor exposure to the detrimental effects of weeds. Alternative 4 would cause a decline in recreation use by allowing noxious weeds to spread as would Alternative 3 where nonchemical treatment would fail to produce the desired results.

Wilderness and Special Areas. The suppression of exotic noxious weeds in wilderness areas and wilderness study areas under Alternatives 1 and 2 would control exotic weeds that compete with native plants. These benefits would be similar under Alternative 3 only if nonchemical treatment sufficiently controls weeds. Alternative 4 would allow nonnative noxious weeds to spread unchecked, adversely affecting native plants.

Economic Conditions. Economic activity related to activities on BLM land (employment and personal income) would increase slightly under Alternatives 1 and 2 and would remain the same or slightly change under Alternative 3. Economic activity would decrease under Alternative 4. Alternatives 3 and 4 would cause economic losses by allowing noxious weeds to spread to nearby nonpublic land. Potential economic losses from the spread of noxious weeds would be less under Alternative 2 than under Alternatives 3 and 4.

Social Conditions. Some unsettling social effects would occur under all alternatives. Alternatives 2, 3, and 4, which emphasize particular uses or restrictions, are likely to generate polarized reactions. Alternative 1 incorporates a variety of weed control practices in an attempt to respond to a range of public attitudes and concerns.

Human Health. Herbicides proposed for use under Alternatives 1 and 2 would present no significant risk of toxicity to workers or the public since they would be used in compliance with labels approved by the Environmental Protection Agency and the state where the herbicide is being applied. Exposure to herbicides would be much greater for workers than for the public. The greatest exposure would occur under Alternative 2. The probability of contracting cancer from herbicide exposure under Alternatives 1 and 2 is low to the worker and expremely low to the public, and the health risk is small relative to other hazardous events.

Increasing hazards from manual treatment would occur under Alternatives 2 and 3 respectively. Alternatives 3 and 4 would increase the health hazard to humans because of the decreased control of weeds that are potential teratogens or cause allergic reactions or serious health defects when ingested. Physical harm can be caused to humans due to the characteristics of some weed species, such as yellow starthistle.

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Chapter 1—Description of Alternatives Including the Proposed Action

Water Hemlock

Purpose of and Need for Action

The Bureau of Land Management (BLM) proposes to implement a program for controlling or eradicating noxious weeds on public land in the northwestern United states. The program would apply to BLM-administered public lands in Idaho, Montana, Oregon, Washington, and Wyoming. (See general location map on inside of front cover.)

BLM's main authority and direction for managing public lands derives from the Federal Land Policy and Management Act of 1976, 43 USC 1700 et seq.. (FLPMA). Under FLPMA, BLM must manage public lands according to the principles of multiple use and sustained yield. These principles are further qualified in FLPMA by the statutory duty that BLM prevent unnecessary degradation of the public lands. In addition to FLPMA, under the Public Rangelands Improvement Act of 1978, 43 USC 1901 et seq.., BLM must "manage, maintain and improve [public lands suitable for livestock grazing] so that they become as productive as feasible... ." In addition, two federal laws direct weed control on federal lands: the Carlson-Foley Act (PL 90-583) and the Federal Noxious Weed Act (PL 93-629). (See Appendix A.) State and county laws also place responsibility for noxious weed control on federal land with the federal government.

Because of the detrimental effects of some noxious weeds on animals and humans, no control in some instances encourages hazard and economic losses as is emphasized in the Federal Noxious Weed Act (PL 93-629), which states that distribution of noxious weeds "... allows the growth and spread of such weeds which cause disease or have other adverse effects on man or his environment, therefore, is detrimental to the agriculture and commerce of the United States and to the public health." According to the National Academy of Sciences (1968), an estimated 75,000 people suffer poisoning by plants annually.

Noxious weeds have become established and are rapidly spreading on both public and private rangeland, woodlands and farm land (Forcella and Harvey, 1981; Messersmith and Lym, 1983; Bucher, 1984; French and Lacey, 1983). As a result, crop yields are being reduced, rangeland in good ecological condition is being invaded, and wildlife habitat is being reduced (Chase, 1985; Bucher, 1984; Kelsey, 1984; Morris and Bedunah, 1984; Penhallegon, 1983). Economic loss from noxious weeds is considerable and runs into the millions of dollars annually in each state in the EIS area, posing a serious menace to the public welfare and the state's economic stability (Kelsey, 1984; Jenson, 1984; Bucher, 1984; Chase, 1985; Lewiston Morning Tribune, 1980; Baker, 1983; Nielson, 1978). Noxious weeds cannot be adequately controlled unless federal, state, county and private interests work together in controlling weeds using effective and efficient means (Lacey and Fay, 1984; French, 1984; Hahnkamp and Pence, 1984; Ali, 1984).

Fourteen noxious weeds have become thoroughly established and are spreading rapidly on public lands in Idaho, Montana, Oregon, Washington, and Wyoming. Table 1-1 shows the acreages affected by noxious weeds, and Maps 1-1a through 1-1e show noxious weed distribution by state. Figures D-1 through D-4 in Appendix D show the distribution and spread of selected noxious weeds. Accordingly, BLM proposes to implement a program for controlling or eradicating these weeds on BLM-administered lands in the northwest United States.

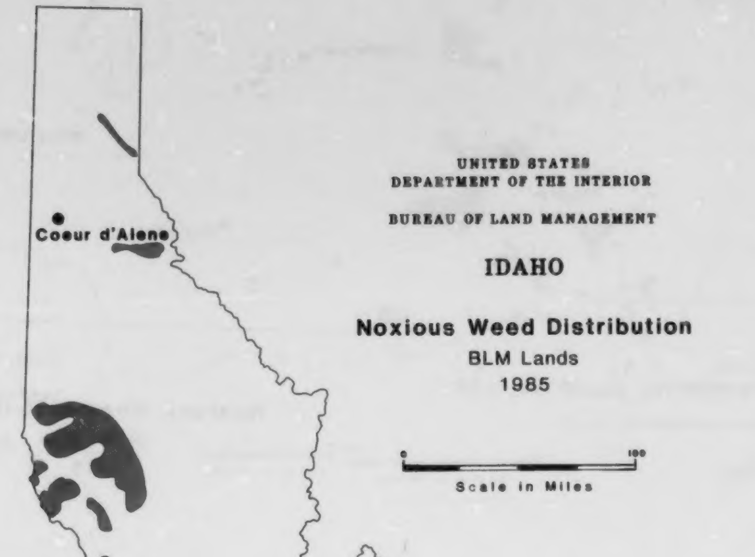
Table 1-1. Acres Affected by Noxious Weeds in EIS Area

	BLM-Administered Land		Other Land in State		Total Area of State	
	Nox. Weeds[1]	Total	Nox. Weeds[2]	Total	Nox. Weeds[2]	Total
Idaho	59,440	11,906,669	3,540,560	41,026,451	3,600,000	52,933,120
Montana	90,852	8,125,262	6,553,583	85,145,778	6,644,435	93,271,040
Oregon	2,255,923	13,572,655	6,985,477	48,026,065	9,241,400	61,598,720
Washington	25,000	310,675	4,438,361	42,383,085	4,463,361	42,693,760
Wyoming	14,133	17,600,000	241,942	44,743,040	256,075	62,343,040
EIS Area Total	2,445,348	51,515,261	21,759,923	261,324,419	24,205,271	312,839,680

[1] Includes all BLM acres.

[2] Include noxious weeds that threaten BLM lands.

Source: BLM Offices; Public Land Statistics - 1983; State Departments of Agriculture in Montana, Oregon, and Wyoning; and State Universities in Idaho and Washington.



UNITED STATES
DEPARTMENT OF THE INTERIOR

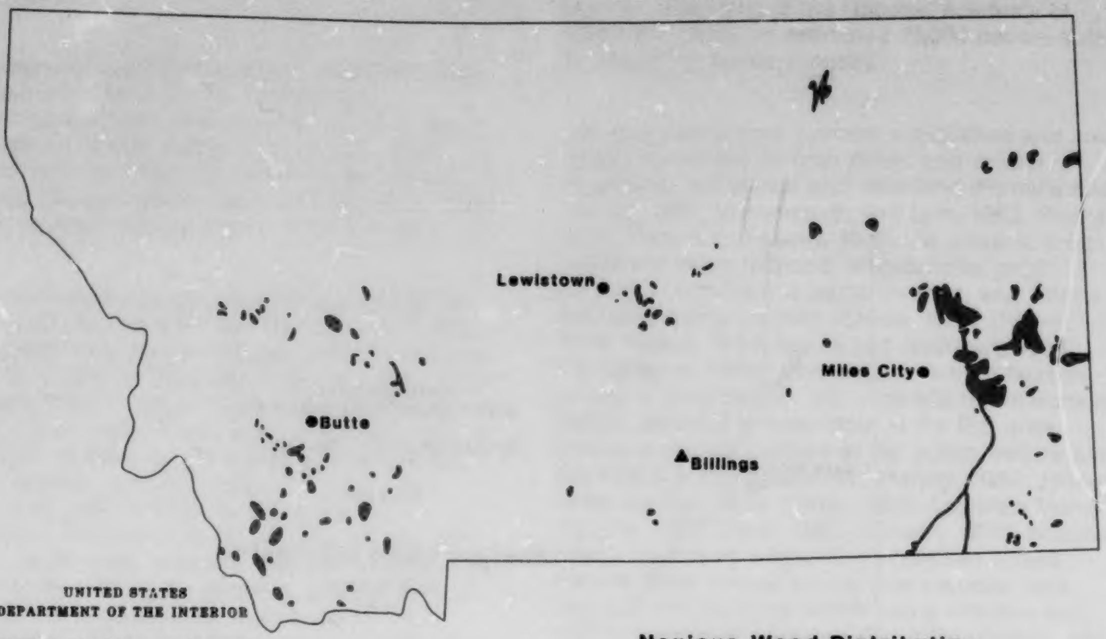
BUREAU OF LAND MANAGEMENT

IDAHO

Noxious Weed Distribution
BLM Lands
1985

0
100
Scale in Miles
Coeur d'Alene
Salmon
Boise
Idaho Falls
Shoshone
Burley

Map 1-1a


Lewistown
Butte
Miles City
Billings

UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MONTANA

0 100
Scale in Miles

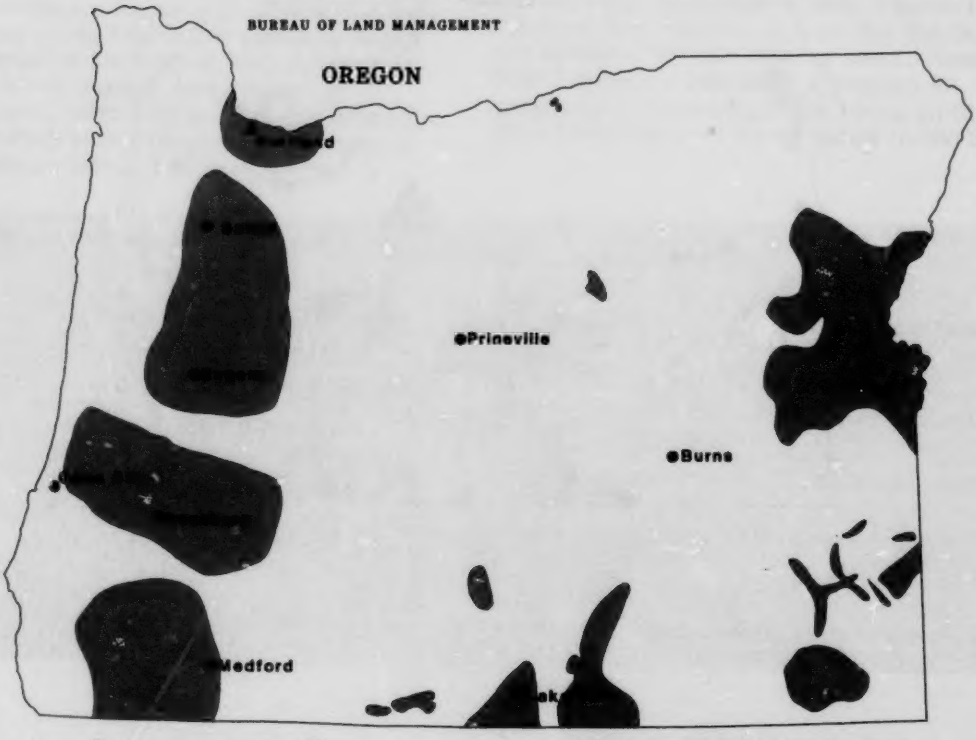
Noxious Weed Distribution
BLM Lands
1985

Map 1-1b

UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

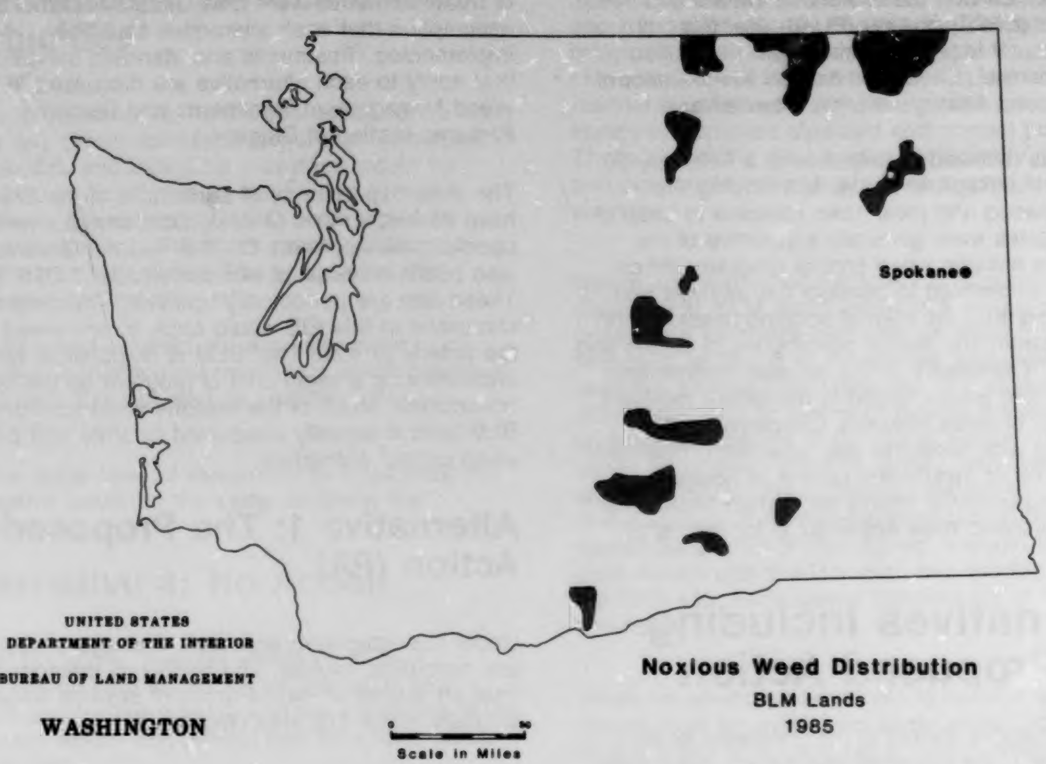
OREGON


Prineville
Burns
Medford

0 100
Scale in Miles

Noxious Weed Distribution
BLM Lands
1985

Map 1-1c

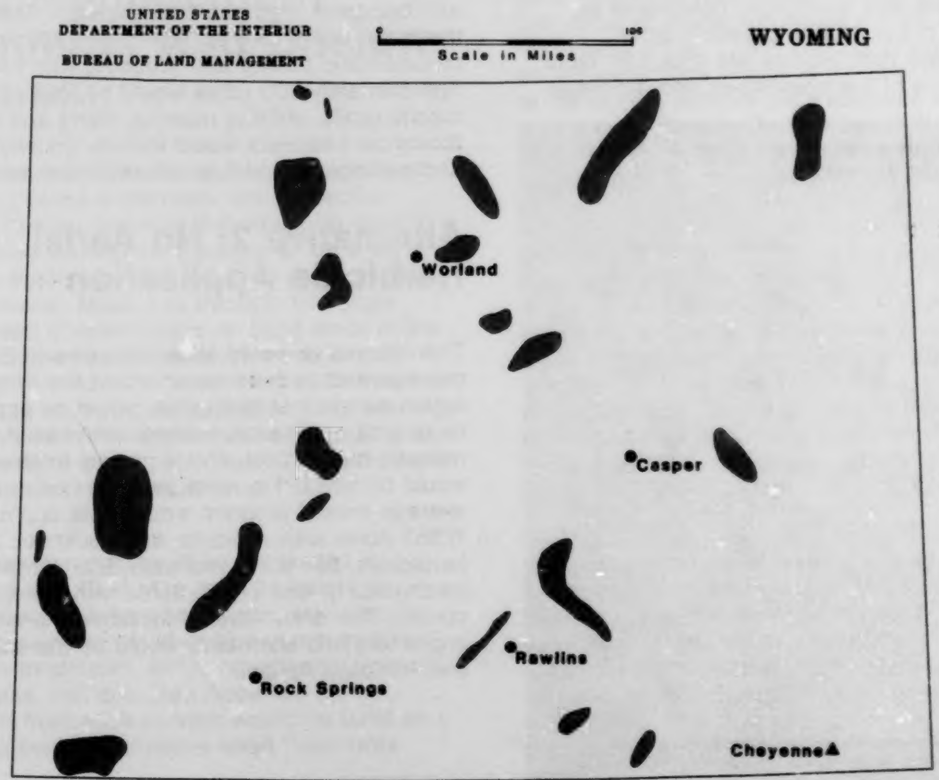

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON
Spokane
0
50
Scale in Miles

Noxious Weed Distribution

BLM Lands

1985

Map 1-1d


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
0
100
Scale in Miles
WYOMING
Worland
Casper
Rawlins
Rock Springs
Cheyenne

Noxious Weed Distribution

BLM Lands

1985

Map 1-1e

In accordance with the National Environmental Policy Act (NEPA) of 1969 (PL 91-190), this environmental impact statement (EIS) identifies impacts on the natural and human environment of the Proposed Action and other alternatives.

Comments received in response to a February 20, 1985 Federal Register notice announcing the scoping period and local news releases in each of the five states were generally supportive of the need for a noxious weed control program. When the team assembled to conduct the analysis and prepare this EIS, an internal scoping session was held to identify the team's perceptions of issues and concerns. The results of this session incorporated concerns and issues raised in the letters received as a result of news releases. Concerns were associated with herbicide use, alternative treatment methods, no or insufficient control of noxious weeds, and potential effects on human health and the environment. (See Appendix B for results of scoping.)

Alternatives Including the Proposed Action

Four alternatives, including the Proposed Action (Alternative 1, the preferred alternative), have been identified for impact analysis in Chapter 3. Differences among alternatives include types of treatments, treatment levels, and constraints on noxious weed management to benefit other resources. These relationships are shown in Table 1-2. Descriptions of the alternatives and estimates of treatment acres were developed under the assumption that each alternative could be implemented. Treatments and standard mitigation that apply to each alternative are discussed in the Weed Management Treatments and Design Features section of Chapter 1.

Table 1-2. Estimated Annual Acreage of Weed Treatments by Alternative [1]

Treatment	Estimated Annual Acreage (P.A.) Alt. 1	 (No Air) Alt. 2	 (No Herb.) Alt. 3	 (No. Act) Alt. 4
Chemical				
helicopter aerial	5,900	0	0	0
ground vehicular	13,666	15,000	0	0
ground backpack	1,678	2,953	0	0
Manual				
hand pulling	4	4	400	0
hand tools	272	277	3,680	0
Mechanical				
mowing	10	10	250	0
tilling	190	190	1,050	0
burning	600	700	910	0
Biological[2]				
grazing	100	200	300	0
insects	21,590	21,630	21,630	0
pathogens	5	10	20	0
Totals	44,014	40,974	28,240	0

[1] Individual state summaries are listed in Appendix H.

[2] Acres may increase as additional biological agents become available for release.

The state departments of agriculture in the EIS area have developed lists of designated noxious weed species (see Appendix C). The Federal Government also publishes a list of noxious weeds (7 CFR 360). These lists are periodically updated. The programs discussed in this EIS would apply to any weed on the federal or state lists. BLM is responsible for implementing a weed control program on the land it administers. Much of the noxious weed control on BLM land is actually conducted by state and county weed control authorities.

Alternative 1: The Proposed Action (PA)

Under this integrated approach, managers would use herbicide, manual, and biological methods to treat an estimated 44,014 acres of noxious weeds annually in the EIS area (Table 1-2).

An estimated 21,243 acres would be treated with herbicides using helicopter aerial, ground vehicle and backpack methods of application. Manual treatment would total approximately 276 acres; and include hand pulling and grubbing with hand tools. Approximately 800 acres would be treated mechanically, utilizing mowing, tilling and burning. Biological treatment would include grazing, insects and pathogens, and total about 21,695 acres.

Alternative 2: No Aerial Herbicide Application

This alternative would allow the same vegetation management techniques as would the Proposed Action except that herbicides would be applied only by ground application methods. Increased use of manual, mechanical, and biological treatments would be needed to meet treatment objectives. The average annual program would treat approximately 17,953 acres with vehicular and backpack applied herbicides, 281 acres manually, 900 acres mechanically, and 21,840 acres with biological control. The dollar level of investment needed to implement this alternative would be the same as for the Proposed Action.

Alternative 3: No Use of Herbicides

Under this alternative, herbicides would not be used under any circumstances, and the use of manual, mechanical, and biological measures would be increased in an attempt to meet weed control objectives. Approximately 4,080 acres would be treated manually, 2,210 acres mechanically, and 21,950 acres biologically. The analysis for this alternative assumes the following:

(1) BLM would contract out a greater number of manual and mechanical treatments which otherwise would have been treated by counties using herbicides.

(2) The dollar level of investment to implement this alternative would be the same as under the Proposed Action.

Alternative 4: No Action

Under No Action, noxious weeds on BLM-administered land would not be treated to stop growth and further spread, and the objectives of the Proposed Action and federal and state laws would not be met.

Weed Management Treatments And Design Features

The purpose of this section is to discuss preventive measures, treatment methods, and protective measures (design features) that would be used in a noxious weed management program. Table 1-2 shows the treatments that would be applied under each alternative. Maps 1-1a through 1-1e show noxious weed concentrations on BLM lands in the EIS area. Some acres may receive one or more treatments in combination, including such treatment combinations as herbicide application and burning, grazing and herbicide application, and grazing and use of insects or pathogens. Treatment would have to be repeated in most situations.

Pretreatment surveys would be conducted in accordance with BLM Manual 9222 before a decision is made to use herbicides on a specific tract. Such surveys would involve consideration of all feasible treatments, including potential impacts, effectiveness, and cost (see Appendix J). Information from such surveys would be used as a basis for prescribing noxious weed treatments.

Special provisions for treatments would be selected according to the scope of the action, accepted mitigation measures, and the physical characteristics of the specific site. BLM manuals, manual supplements, and field guides provide a variety of approved standard and special provisions. These provisions are updated periodically as pre- and post-treatment analysis finds a need for change.

Before any vegetation treatment or ground disturbance, BLM policy requires a survey of the project site for plants and animals listed or proposed for listing as threatened, endangered, and sensitive species (see Glossary). If a project might affect any listed or proposed federal threatened or endangered species or its critical habitat, BLM would make every effort to modify, relocate, or abandon the project to obtain a no effect determination. If BLM determines that a project cannot be altered or abandoned, it would initiate consultation with the U.S. Fish and Wildlife Service (50 CFR 402; Endangered Species Act of 1973, as amended).

When no effective alternatives to noxious weed control exist for wilderness study areas (WSAs), BLM's policy is to carry out a control program, but only in small areas. BLM is required to manage WSAs so as not to impair their suitability for preservation as wilderness. Therefore, some actions can occur in WSAs that would not be allowed in wilderness areas. These actions, however, could not impair wilderness values at the time the Secretary of the Interior submits his wilderness suitability recommendations to the President (BLM Interim Management Policy and Guidelines for Lands Under Wilderness Review, USDI, BLM 1979).

In wilderness areas, BLM's policy is to allow natural ecological processes to occur and to be interfered with only in rare circumstances. Noxious weeds would not ordinarily be controlled in wilderness areas unless these weeds threaten outside lands or are spreading within the wilderness. In those cases, noxious weeds may be grubbed or controlled with chemicals, provided the control can be effected without seriously impairing wilderness values (BLM Wilderness Management Policy--USDI, BLM 1981).

Whenever evidence of historic or prehistoric occupation is found during BLM activities, special surveys are undertaken to determine possible conflicts in management objectives. In addition, a Class III (complete) cultural resources inventory is required on all areas to be subjected to ground disturbance. This inventory is conducted in the preplanning stage of an action, and the results are analyzed in an environmental analysis addressing the action (BLM Manual 8100, Cultural Resource Management). When a cultural resource that might be harmed is discovered during weed treatment, nearby operations are immediately suspended and may resume only upon receipt of written instructions from the BLM authorized officer. Procedures under 36 CFR 800 would be followed, including consultation with the State Historic Preservation Officer in determining eligibility for nomination to the National Register of Historic Places, effect, and adverse effects.

BLM will assure that noxious weed infestations are noted and considered during appraisals of any land proposed for exchange.

Preventive management is important in preventing or retarding the spread of noxious weeds. The method of spread of noxious weeds that has the greatest impact on all landowners is the continued spread by vehicles, machinery or cargo along highways, railroads and rights-of-ways. Noxious weeds also spread downstream from points of sources of infestation by seed deposit into the water. Where livestock are being moved from a weed-infested pasture to a weed-free pasture, they should be confined to a small area for several days to prevent weed introduction into the weed-free pasture. Weeds can also be introduced by hay and other foodstuffs. Label restrictions dealing with buffer zones, feeding areas and holding pastures will be observed.

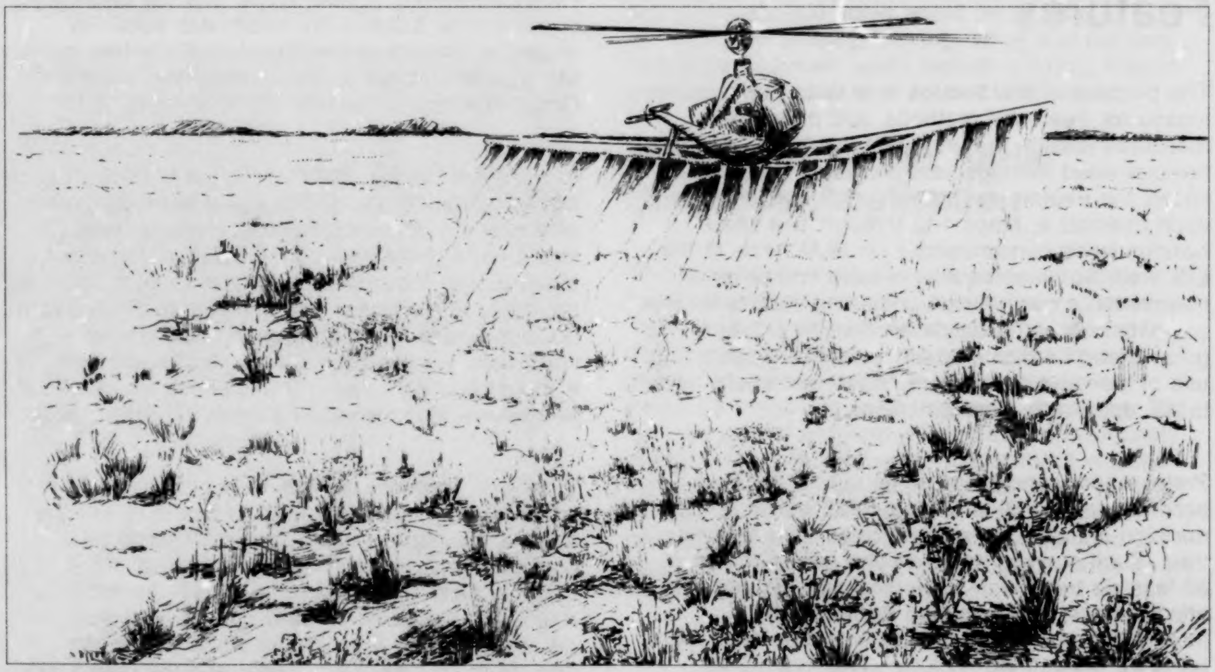
Chemical Methods

Stage of plant growth and season of application are especially important in prescribing chemical (herbicide) treatments as proposed by Alternatives 1 and 2. Plant susceptibility to herbicides varies seasonally and widely throughout the EIS area. Information on the most effective timing of applications appears in published research and on herbicide labels.

The herbicides 2,4-D, picloram, dicamba, and glyphosate are the only four proposed for use at this time. Other or new herbicides could be proposed for use in the future, but before their use, a hazard assessment similar to those in Appendix K will be conducted and appropriately documented.

Glyphosate is a nonselective herbicide that is not labeled for range use but is labeled for use along waterways and reservoirs and in recreation areas. Precautions would be taken to ensure that water will not be contaminated and that glyphossate would be used only for small infestations. Dicamba, 2,4-D, and picloram are selective herbicides that can injure or kill broadleaf herbaceous plants, depending upon the rate and method of application, without injuring grasses when label guidelines are adhered to.

Information on herbicides proposed for use is presented in Table 1-3. More detailed information



Aerial Application of Herbicides.

Table 1-3. Estimated Annual Acreage of Chemical Treatment by Method and Herbicide [1] [2]

			Estimated Annual Acreage	
Herbicide	Major Trade Name	Expected Maximum Rate of Application [3]	(P.A.) Alt. 1	(No Air) Alt. 2
Helicopter				
2,4-D amine salt or butyl ester		3 lbs. ai/acre	650	0
Picloram[5]	Tordon 22K (liquid)	1 lbs. ai/acre	930	0
Picloram	Tordon 2K (granular)	1 lbs. ai/acre	2,800	
2,4-D and Dicamba [4]	Tank mix	2 lb. ai/acre 2,4-D 1-1/2 lb. ai/acre Banvel	1,520	0
Ground Vehicle				
2,4-D amine salt or butyl ester		3 lbs. ai/acre	1,315	1,430
Dicamba	Banvel	6 lbs. ai/acre	250	200
Picloram	Tordon 22K (liquid)	1 lb. ai/acre	2,316	2,713
Picloram	Tordon 2K (granular)	1 lb. ai/acre	1,550	1,950
2,4-D and Dicamba	Tank mix	2 lb. ai/acre 2,4-D 1-1/2 lb. ai/acre Banvel	7,435	7,725
2,4-D and Picloram	Tank mix	1 lb. ai/acre 2,4-D 1/2 lb. ai/acre Tordon	694	844
Glyphosate	Roundup	3 lbs. ai/acre	105	120
Ground Hand				
2,4-D amine salt or butyl ester		3 lbs. ai/acre	197	145
Dicamba	Banvel	6 lbs. ai/acre	20	20
Picloram	Tordon 22K (liquid)	1 lb. ai/acre	342	435
Picloram	Tordon 2K (granular)	1 lb. ai/acre	315	455
2,4-D and Dicamba	Tank mix	2 lb. ai/acre 2,4-D 1-1/2 lb. ai/acre Banvel	682	1,731
2,4-D and Picloram	Tank mix	1 lb. ai/acre 2,4-D 1/2 lb. ai/acre Tordon	80	125
Glyphosate	Roundup	3 lbs. ai/acre	42	42

[1] Liquids would be applied using water as the carrier.
[2] Individual state summaries are listed in Appendix H.
[3] Expected maximum application rates that would be used, actual application rates may be less.
[4] Dicamba will not be applied aerially by itself, only as a mix with 2,4-D.
[5] No more than one application of picloram will be made on a given site in any given year to reduce the potential for picloram accumulation in the soil.
ai = active ingredient

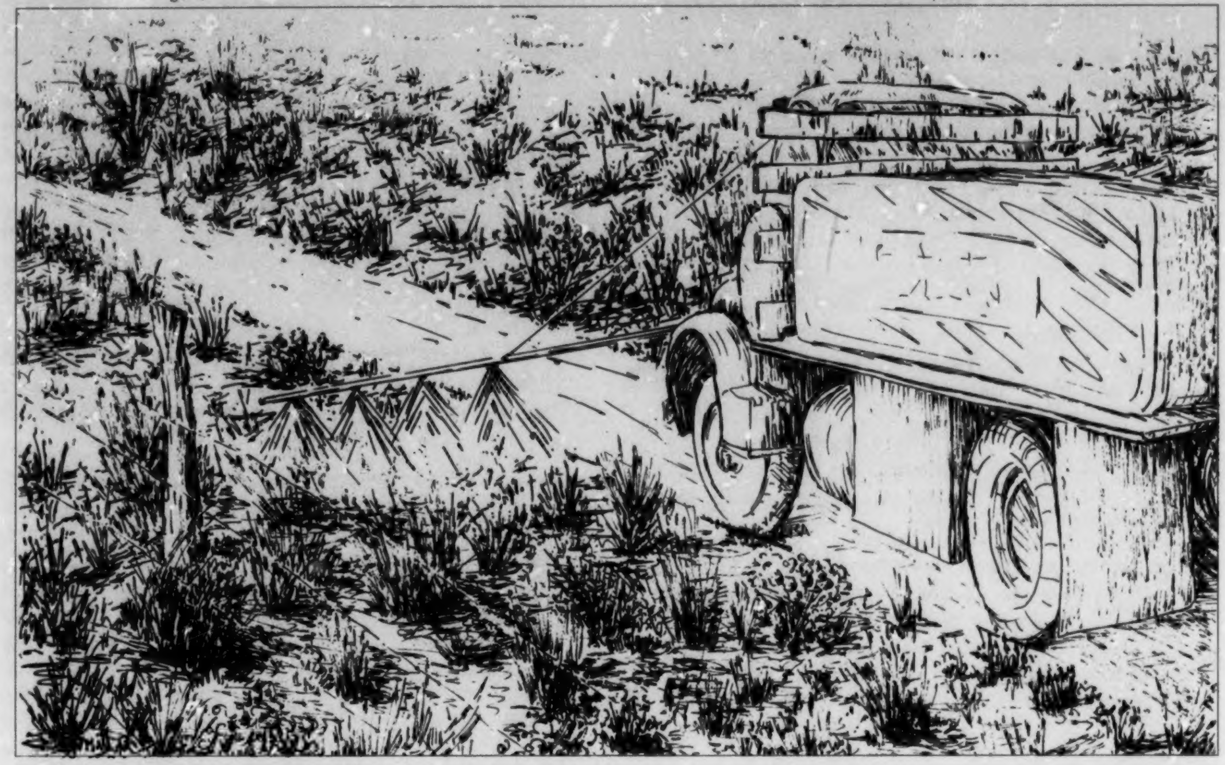
can be found in Appendix K, on herbicide labels, or in the following documents: Pesticides Background Statement (USDA, FS 1984), Environmental Fates and Impacts of Forest Use Pesticides (Ghassemi and others 1981), Transmission Facilities Vegetation Management Program Final EIS (DOE, BPA 1983), Environmental Effects of Vegetation Management Practices on DNR Lands (Newton and Dost 1981) and Biological and Physical Effects of Forest Vegetation Management (Newton and Dost 1984). Herbicides would be applied and monitored in accordance with BLM Manual 9222, Chemical Pest Control.

Herbicides are applied in several ways, depending upon the treatment objective, topography of the treatment area, target species, expected costs, equipment limitations, and potential environmental impacts.

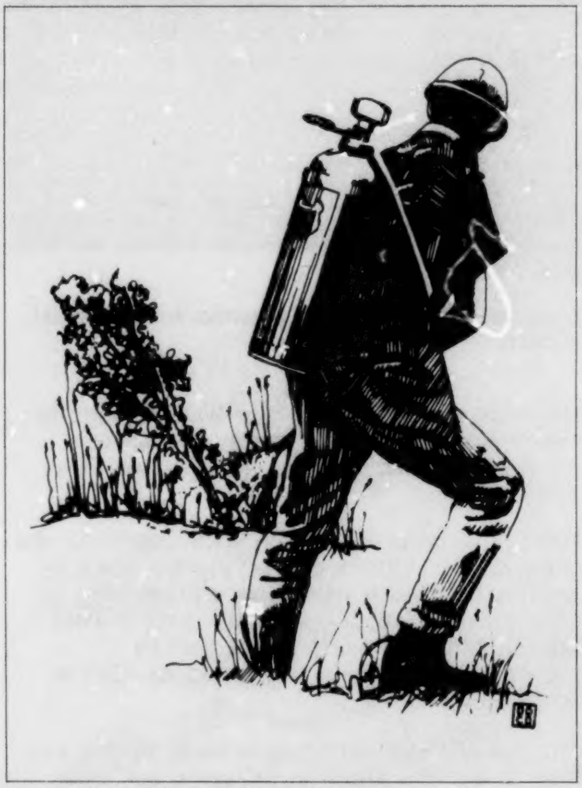
Herbicide applications would be timed to have the least impact on nontarget plants and animals consistent with the objective of the noxious weed control program.

Rates of herbicide application would depend on the target species, other vegetation present, soil type, depth of the ground water table, and presence of other water sources. Where weeds have infested riparian areas and woody draws, the rate of application would be reduced to reduce injury to nontarget species.

The size of areas that would be treated would vary from 10 feet in diameter to 100 acres, but, most



Applying herbicides with ground vehicle.



Applying herbicides with backpack sprayer.

such areas would vary from 10 feet in diameter to less than 5 acres. The normal area of treatment by helicopter would be less than 100 acres.

Helicopters would be used for all aerial applications, and nozzles to reduce drift would be used for all liquid applications. Liquid herbicides would not be applied when wind speeds exceed 5 miles per hour (mph), and granular herbicides would not be applied when wind speeds exceed 10 mph. Herbicides would not be applied when conditions stated on the herbicide label cannot be met and when air turbulence significantly affects the desired spray pattern. Buffer zones (see Glossary) to protect water resources would be provided according to individual state regulations and guidelines and herbicide labels.

Vehicle-mounted sprayer (hand gun or boom) applications would be mainly used in open areas that are readily accessible by vehicle. The boom would be used only where feasible to treat concentrated weed infestations. The hand gun would be used for spot treatment of weeds and only up to the highwater line near water bodies. Neither hand guns nor booms would be used in riparian areas where weeds are closely intermingled with shrubs and trees. Under both hand gun and boom methods, sprays would be applied in a manner that gives the best possible coverage with the least amount of drift, and only when wind velocity is below 8 mph, except in riparian areas where treatment would be applied only at wind velocities below 5 mph. Boom sprayers would not be used within 25 feet of water bodies.

Hand applications could involve backpack spraying, wiper application, and cyclone broadcast spreading (granular formulations). Backpack sprayers are operated at low pressure and low volume and release herbicide through a single nozzle held from 0.5 to 2.5 feet above the ground when wind velocities do not exceed 8 mph. (Near water, wind velocities cannot exceed 5 mph.) Contact systemic herbicides (see Glossary), such as glyphosate, wiped on individual plants, would be used up to the existing high water line. Granular formulations would be applied through broadcast spreaders at about 3.5 feet above the ground and no closer than 10 feet from the high water line of streams and other water bodies.

Manual Methods

Hand pulling and hand tools (shovel, hoe, pulaski,) would be employed under all alternatives (Table 1-2) except Alternative 4 (No Action). These methods are highly labor intensive, requiring periodic retreatment, ranging from every 3 weeks during the growing season to annually, depending on the target species. These methods have been successful in controlling annuals and biennials but are ineffective in controlling creeping perennials.

Mechanical Methods

Burning, mowing, and tilling would be used under all alternatives except Alternative 4. (Table 1-2).

Noxious weeds would be burned when weather or fuel conditions are favorable, usually between March and November and only at times approved by state organizations responsible for smoke management. Burning permits will be obtained where required.

All burning would be conducted in accordance with BLM's Fire Management Policy (BLM Manual 9210), which requires the preparation of a prescribed burning plan before every burn. The prescribed burning plan addresses the following: physical characteristics of the burn area, objectives of the burn, fuels on site (loading and characteristics), weather conditions under which the plan will be carried out, expected fire behavior, air and water quality restrictions, ignition pattern and sequence, emergency fire control force requirements, public contacts, and safety.

Three methods are normally used in igniting prescribed burns. One method is the use of truck-mounted propane flamethrowers. Drip torches are used to apply a burning mixture of diesel fuel and gasoline by hand. Hand-held fusees are similar to flares and are touched directly to the vegetation to ignite it. When using either hand-carried drip torches or fusees, individuals cross the burn area in a specified pattern described in the prescribed burning plan. Tailoring traverse patterns to each burn area can maintain effectiveness, maximum safety, and control.

Mowing and tilling (discing) prevent plants from producing seeds when treated in the bud stage or earlier. Efforts repeated every 21 days during the growing season can deplete the underground food supply of some perennials. This method would be required for at least a 3-year period to attain satisfactory control and would be considered only in areas where slope is less than 10 percent and a small percentage of the vegetation consists of shrubs. This method would also weaken nontarget species in treated areas.

Biological Methods

Insects, pathogens, and grazing by sheep or goats would be used as biological weed control methods under all alternatives except Alternative 4, although these methods can control few weed species. Biological control using sheep or goats would be applied to small areas for short periods. Areas where insects and pathogens naturally occur or are introduced should be protected from other control methods to maintain the density of host plants upon which the relationship between host plant and the controlling organism depends.

Extremely small supplies of biological agents exist for release on noxious weeds with the EIS area, and these insects and pathogens might not be able to survive in all parts of the EIS area because of severe climates. The following numbers of insects species are being tested in the EIS area: six species for leafy spurge, three for spotted and diffuse knapweed, three for musk thistle, three for tansy ragwort, two for Canada thistle, two for St. John's wort, and one for dalmation toadflax. Many of the insects have not been established, and no pathogens are available for biological control in the EIS area.

In most circumstances the biological control agents used may be putting stresses on noxious weeds, but are generally not performing control.

Comparison of Impacts

Table 1-4 compares the impacts of of all four alternatives. Although the impacts are described in detail in Chapter 3, Table 1-4 is presented to assist decisionmakers and reviewers by concisely summarizing and comparing the major impacts by alternative.

Table 1-4. Summary of Impacts By Alternative

	Existing Situation	Alternative 1 (Proposed Action)	Alternative 2 (No Aerial Herbicide Application
Air Quality	Smoke intrusions from wood stoves sometimes results in particulate levels exceeding EPA standards in urban areas during periods of atmospheric stability.	Moderate, short-term increases in intrusions expected, but EPA standards would not be exceeded.	About the same impacts as under Alternative 1.
Soils	There is a great variation in soils across the EIS area due to differences in climate, parent material, and topography.	Short-term increases in erosion, long-term stabilization. Herbicides more persistant in arid area soils.	About the same impacts as under Alternative 1.
Water Quality	No detectable levels of herbicides on west coast but some detectable in Wyoming. Water quality good in west coast streams. Varying water quality on streams in rest of EIS area	Some detectable levels of herbicides will enter streams from drift; short-term impact may result from spraying in ephemeral stream channels.	Less spray drift.
Vegetation	Noxious weeds are spreading on BLM lands within EIS area. Reduced productivity of desirable range vegetation due to competition from noxious weeds. Weeds invading adjacent private land.	Production of grass species would increase. Some injury or loss of nontarget vegetation may occur from using herbicides. Non-target species will become reestablished after treatment.	Production of grass species would increase. Some injury or loss of nontarget vegetation may occur from the use of herbicides. Degree of effects would be less than under the Proposed Action (fewer acres treated with herbicides). No target species will become reestablished after treatment.
Animals **Livestock** **Wild Horses** **Wildlife**	Livestock grazing is one of the primary uses of BLM lands in the EIS area. Wildlife diversity abundance and habitat values are high.	Adverse impacts would be temporary and localized. However, over the short and long term, animal habitat would improve benefiting all species populations.	About the same impacts as under Alternative 1.
Fish	Most habitat is in fair to good condition.	Habitat conditions and population levels would remain unchanged.	About the same impacts as under Alternative 1.
Cultural Resources		Low probability of site damage.	Low probability of site damage.
Visual Resources and Recreation	Outdoor recreation occurs throughout EIS area. Camping and picnicking occur in designated recreation sites that have noxious weeds.	Low probability of scenic degradation. Recreation areas infested with noxious weeds would benefit by decreased visitor exposure to adverse affects from weeds. Visitor use would increase.	About the same impacts as under Alternative 1.
Wilderness and Special Areas	The EIS area contains five designated wilderness areas and 224 wilderness study areas	Noxious weeds in wilderness areas and WSAs may be controlled. Suppression of noxious weeds would allow native plants in the natural ecosystem to better compete.	About the same impacts as Alternative 1.
Economic Conditions	Little economic production on weed-infested land. Ingestion of poisonous plants by livestock cause deaths and production decreases. Weeds spreading from BLM land are contributing to economic losses on adjacent nonpublic land.	Beneficial economic impacts to the region: increased livestock production, fewer livestock deaths, and potential decrease in economic losses. Local expenditures on equipment and materials for weed control would benefit local economy.	Beneficial economic impacts to the region: Increase in livestock production and fewer livestock deaths. Some weeds would spread to noninfested land, causing economic losses. Local expenditures on equipment and materials for weed control would benefit the economy.
Social Environment		Likely to generate more constructive social responses and concerns.	Likely to generate polarized reactions.
Human Health		No adverse impacts expected from use of herbicides. Human health would benefit from control of those noxious weeds that adversely affect humans.	Herbicide related impacts similar to those unde Alternative 1. More workers would be exposed herbicides. Hazards of manual control methods would increase.

Alternative 3 (No Herbicide Use)	Alternative 4 (No Action)
Slightly higher impacts than Alt. 1. EPA standards not exceeded.	No smoke intrusions would occur.
Short-term increases in erosion where burning and tilling take place. Long-term stabilization.	No change from existing environment.
Slightly increased suspended sediments and dissolved solids from mechanical and grazing controls.	No change from existing environment.
Some degree of weed control would be achieved, but noxious weeds would spread due to ineffective weed control efforts. Desirable vegetation would decline.	Spread of noxious weeds, thus reduction in desirable vegetation.
Where nonchemical measures fail to control weeds, weeds would continue to crowd out and reduce desirable forage and habitat for animals reducing wildlife diversity and leading to livestock herd reductions. Toxic plants would harm animals where not controlled with nonchemical methods.	Noxious weeds would spread unchecked and reduce desirable forage and habitat for animals and would reduce wildlife diversity. Toxic weeds would harm animals leading to livestock herd reductions.
About the same impacts as under Alternative 1.	About the same impacts as under Alternative 1.
Low probability of site damage	No probability of site damage.
Spread of noxious weeds would increase exposure of recreationalists to detrimental effects when nonchemical measures fail to control these weeds. Visitor use reduced in such areas.	Increased exposure of recreationalists to detrimental effects of noxious weeds. Visitor use would be reduced.
Impacts would be the same as under Alternative 1 only when nonchemical measures sufficiently control noxious weeds. Otherwise, impacts would be the same as under Alternative 4.	Noxious weeds, including exotics, in wilderness and WSAs would spread unchecked and compete with native plants, decreasing naturalness.
Beneficial and adverse impacts to the local economy. Slight increase in livestock production where weeds are controlled, but potential further economic losses, livestock deaths,and lower livestock production over time where weeds are not controlled. Weeds spreading to noninfested land would cause additional economic losses.	Economic losses, livestock deaths, and lower livestock production would continue over time. Weeds would spread to nonpublic land contributing to a decline in productivity and economic loss.
Likely to generate a polarized reaction.	About the same impacts as under Alternative 3.
More adverse impacts from more manual control methods and less control of weeds hazardous to human health.	Greatest adverse effects from a lack of control of weeds hazardous to human health. This can be caused by allergies, poisoning or physical harm depending upon the individual weed species.

Implementation

Final Decisions

At least 30-days after EPA publishes the notice of availability of this final EIS, BLM decisionmakers will evaluate public comment on the draft and final EISs and prepare a record of decision. The decision may be to select one of the alternatives intact or to combine features from several alternatives that fall within the range of actions analyzed in this EIS. The Record of Decision will address significant impacts, alternatives, environmental preferences, and relevant economic and technical considerations.

Monitoring and Studies

Currently, most vegetation management treatments are monitored through administration of contracts under which the practices are authorized. Continuous administration of active slash burning and herbicide spraying contracts is required. Prescribed burns are monitored in progress, and the effectiveness of burns is assessed in postburn evaluation reports. Weed management at most recreation sites and along roads and hiking trails is routine maintenance work conducted and monitored by Bureau employees.

Impacts that weed management treatments have on other resources would also be monitored. Currently, each State Department of Environmental Quality monitors air quality by measuring particulate levels in the atmosphere. Water quality monitoring would be carried out in accordance with Executive Orders 11514 (partially amended by 11991) and 12088, Sections 208 and 313 of the Clean Water Act, BLM Manual 7240. Additional monitoring systems for other resources (watershed, wildlife, etc.) as identified and outlined in the final decision will be developed and implemented. Effectiveness of mitigating measures identified in project-specific environmental documents will be monitored through periodic inspections of selected projects.

Requirements for Further Environmental Analysis

This EIS is a regional programmatic statement for controlling noxious weeds on BLM-administered lands in Idaho, Montana, Oregon, Washington, and Wyoming and is intended to guide this program for the next 10-15 years. Site-specific environmental analysis and documentation (including application of categorical exclusions where appropriate) will be accomplished at the state or district level on proposed weed control plans. During site-specific analysis and documentation, public involvement will occur in accordance with the CEQ Regulations for implementing NEPA. Interdisciplinary impact analyses will be based upon this and other EISs, such as resource management plan, timber management plan, and grazing management plan EISs.

If analysis finds potential for significant impacts not already described in an existing EIS, another EIS or a supplement to an existing EIS may be required.

Interrelationships

The scattered nature of BLM-administered land in the EIS area makes it essential for BLM to coordinate its weed management activities with adjacent landowners and managers. BLM also works closely with other government agencies responsible for special resource management programs. This section briefly describes major interrelationships involved in the weed control program.

Federal Government

BLM shares common boundaries with several national forests and routinely coordinates with Forest Service supervisors and staffs. Specific project and program coordination takes place as needed between all management levels of each agency.

The U.S. Environmental Protection Agency (EPA) has responsibility for herbicide registration (40 CFR 162), including determining that a herbicide will not generally cause unreasonable adverse effects on the environment. EPA's determinations are based upon research data supplied by the applicant for registration.

The U.S. Fish and Wildlife Services administers the Endangered Species Act of 1973 (PL 93-205), as mended. Accordingly, BLM consults with that agency when it is determined that a federally listed or proposed threatened or endangered species or its critical habitat may be affected. The purpose of consultation is to avoid adverse impacts to the species in question. Such consultation may result in modification or abandonment of an action.

The National Park Service (NPS) administers the Nationwide Rivers Inventory, as provided under the National Wild and Scenic Rivers Act of 1968 (PL 90-542). Present efforts are directed toward inventory and evaluation to determine which freeflowing rivers and river segments are suitable for possible designation as components of the National Wild and Scenic Rivers System. BLM consultation with NPS is required if proposed management actions could alter a river's ability to meet established Wild and Scenic Rivers Act eligibility, classification criteria, or both.

Tribal governments will be consulted when noxious weeds are controlled along the common boundaries between BLM and Indian trust lands.

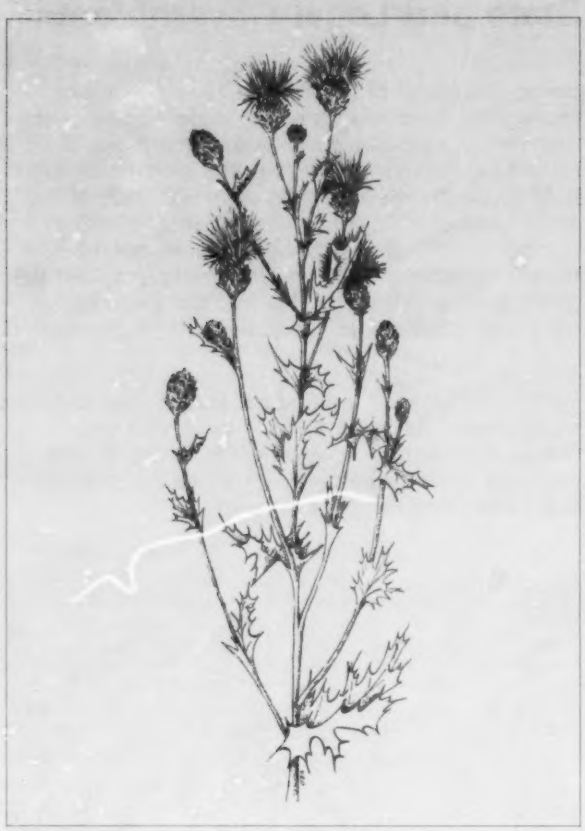
State and Local Governments

Section 202(c)(9) of the Federal Land Policy and Management Act requires BLM to develop resource management programs consistent with those of state and local governments to the extent that such BLM programs are also consistent with federal law and regulations. BLM coordination efforts involve a number of state and local agencies as described below. Table 1-5 shows the relationship between the alternatives presented in this EIS and generalized goals and concerns of the states in the EIS area.

Section 202(c)(8) of the Federal Land Policy and Management Act requires BLM to provide for compliance with applicable pollution control laws, including State and Federal air and water pollution standards or implementation plans.

Table 1-5. Relationship of Alternatives to State Resource Protection Goals and Concerns

Protection Goals and Concerns	Discussions
Forest land for forest use	Under the No Herbicide and No Action alternatives (Alternatives 3 and 4), weed infestation would continue to increase in some suitable forest lands. Under the Proposed Action and No Aerial Application alternatives (Alternatives 1 and 2), herbicides could injure forest trees on some forest lands.
Cropland, range, and pasture	Under Alternatives 3 and 4, weed infestation would continue to increase in some areas of cropland, range, and pasture.
Fish and wildlife areas and habitats	Over the short and long-term, wildlife habitat would improve under Alternatives 1 and 2, benefiting all species populations. The reduction of desirable forage and habitat would reduce wildlife diversity under Alternative 4, and to a lesser extent, under Alternative 3.
Outstanding scenic views and sites	Some localized, degradation of scenic quality for short periods, but overall impacts would be insignificant.
Water areas, wetlands, watersheds, and ground water resources	Water quantity would not be significantly affected by any alternative. Under Alternative 4, weed seed would be spread by water. Also see water quality (below).
Wilderness areas	Noxious weeds will be controlled in wilderness and wilderness study areas.
Historic areas, sites, structures, and objects	Historic sites would either be protected or salvaged, if appropriate, under all alternatives.
Archeological sites	Known archeological sites would either be protected or salvaged, if appropriate, under all alternatives.
Potential and approved recreation trails	Trails serve as avenues of spread. Heavy stands of thistle discourage use. Some weed control practices could be visible from approved trails.
Potential and approved federal wild and scenic waterways and state scenic waterways	Approved waterways would not be directly affected by any alternative. Some weed control practices could be visible from approved waterways.
To maintain and improve the quality of the air, water, and land resources	
Air quality	The major pollutants and contaminants affecting air quality would be smoke from prescribed burns of weed-infested areas. Burning of designated areas would not exceed state or federal standards under any alternative. Burning would be conducted in accordance with state smoke management plans.
Water quality	Sediments and herbicide drift could affect water quality but are not expected to violate state or federal water quality standards.
Land (soils)	Short-term increases in erosion but long-term stabilization under Alternative 1, 2, and 3. Also, herbicides more persistant in arid area soils.
To protect life and property from natural disasters and hazards	Design features under all alternatives would protect life and property from hazards. Alternatives 3 and 4 have limitations that would further protect against hazards.
To satisfy the recreation needs of state residents and visitors	Except under Alternative 4, developed recreation sites would be protected. Decreased visitor exposure to adverse effects of noxious weeds under Alternatives 1 and 2. Alternative 4 would increase exposure of recreationalist to detrimental effects of weeds.
To diversify and improve the economy of the state	Alternatives 1 and 2 would slightly benefit the local economy; Alternative 3 would have minimal impacts on the local economy; and economic losses would continue or increase under Alternative 4.



Canada Thistle

Permittees and grantees operating within rights-of-way on BLM-administered lands are required to comply with Department of the Interior herbicide regulations.

State and county weed control laws place responsibility for noxious weed control on the individual land owners, including federal government.

Idaho

The Idaho Noxious Weed Law (Title 22, Chapter 24, Idaho Code) declares that noxious weeds have become established, are spreading rapidly on public and private lands, and pose a serious menace to the public welfare and the state's economic stability. This law places responsibility for noxious weed control on the individual landowner and operator and on the county, state, and federal governments.

BLM will coordinate its weed control program with the Idaho Department of Agriculture and county weed control officials. Most of BLM's weed control work in Idaho has historically been carried out by county weed control officials acting under cooperative agreement with BLM district offices. This trend is expected to continue in the future. The Idaho Department of Fish and Game will be given an opportunity to review this EIS, and any of their concerns will be considered in implementing the program.

Montana

BLM has established close relations with the Montana State Department of Agriculture to ensure cooperation and coordination of planned BLM and state weed control programs. BLM also regularly coordinates weed control proposals with the Montana Department of Natural Resources and Conservation, the Montana Department of Health and Environmental Sciences, and the Montana Environmental Quality Council to ensure environmental protection within Montana. Management of state fish, wildlife, and parks is the responsibility of the Montana Department of Fish, Wildlife and Parks (MDFW&P). In considering proposals for vegetation management on lands under its jurisdiction, BLM coordinates wildlife habitat impacts with MDFW&P. The Sikes Act (PL 93-452), as amended, provides the main guidance for coordination between BLM and MDFW&P. Cooperative agreements and memoranda of understanding describe the specific responsibilities of the two agencies.

BLM has established research liaison with the Montana State University Extension and Research Services on weed control methods and recommendations. BLM has located infestation sites that can be used for testing biological agents for weed control on public lands.

Cooperation has been established with the 56 county weed boards in Montana. Joint cooperative weed control efforts are being established among BLM, county weed boards, and private landowners on a basin-by-basin concept.

Oregon

The Intergovernmental Relations Division for the State of Oregon is the clearinghouse for state agencies to which BLM provides notices of all its major proposed actions for coordinated state-level review. Areawide clearinghouses coordinate the review of proposed BLM activities by county and local governments in their respective areas of interest.

BLM has established close relations with the Oregon State Department of Agriculture to ensure cooperation and coordination in noxious weed control and eradication efforts. BLM districts coordinate on a project-specific basis with the individual weed control districts in 28 counties.

In accordance with a memorandum of understanding (MOU-OR 56), the Oregon State Department of Agriculture Pesticide Use Clearinghouse has been established to assist in the review of herbicide use proposals by federal, state, and industry organizations. The signatory members of the memorandum of understanding will review all proposals made by BLM in Oregon.

The Oregon Department of Fish and Wildlife (ODFW) has the responsibility for managing Oregon's wildlife and fish. In managing lands under its jurisdiction, BLM considers wildlife habitat as a resource category. The Sikes Act (PL 93-452), as amended, is the main tool guiding coordination between BLM and ODFW. Cooperative agreements and memorandums of understanding describe the responsibilities of the two agencies.

To comply with the Clean Air Act of 1963 (PL 88-206), as amended, BLM cooperates in the statewide Smoke Management Plan administered by the Oregon State Forester. The main objective of the plan is to keep smoke from prescribed fires away from population centers and other smoke-sensitive areas. Slash burning is allowed only when smoke dispersion conditions are determined to be favorable by the Oregon State Department of Forestry.

The Oregon Department of Environmental Quality (ODEQ) has lead responsibility for statewide water quality management planning in accordance with Section 208 of the Federal Water Pollution Control Act (PL 92-500), as amended by the Clean Water Act (PL 95-217). BLM and ODEQ have entered into a memorandum of understanding (MOU-OR 158) that outlines their respective roles in meeting state water quality objectives. The memorandum assures close interagency cooperation in developing and implementing practices and control measures to comply with the Clean Water Act and state requirements. BLM weed management practices meet or exceed objectives of the statewide water quality management plan.

Washington

The noxious weed control program in Washington is administered by the Washington State Department of Agriculture through county weed control districts. BLM coordinates with these local weed districts, irrigation companies, the Washington State Department of Natural Resources (DNR) and BLM range permittees in the control of noxious weeds. The scattered land pattern of BLM-administered lands has made it essential to work closely with federal, state, and local governments. The focus of weed control efforts on BLM land has been in northeastern Washington. A cooperative effort has been undertaken by BLM, DNR, Washington State University, Washington State Department of Game and other land owners to pursue biological control measures to curb the spread of noxious weeds into new areas.

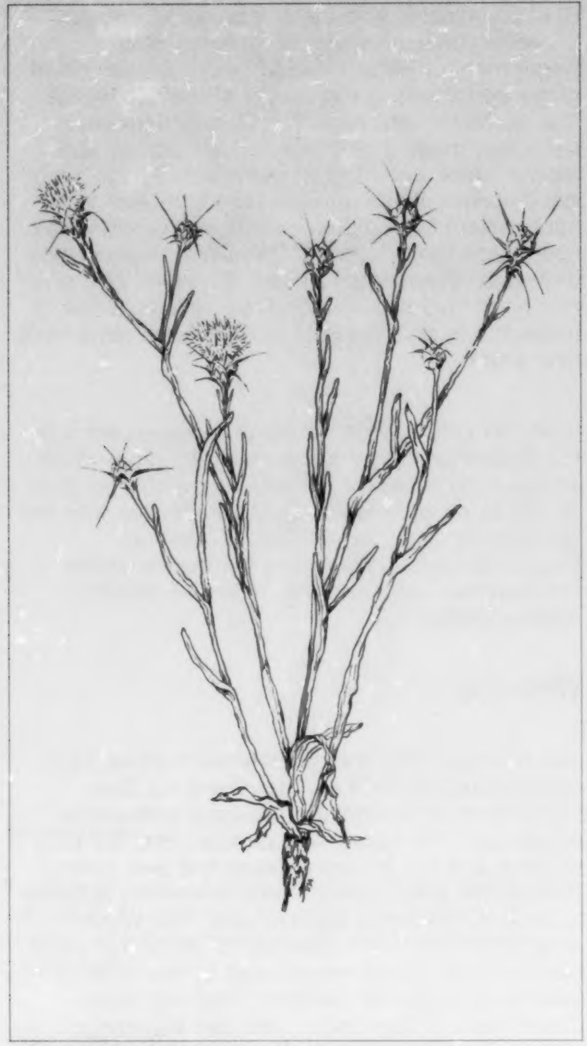
BLM has entered into cooperative agreement with the Washington State Department of Game which address objectives for recreation and conservation of wildlife on BLM lands. BLM coordinates with the Washington State Department of National Resources which administers the state's smoke management portion of the State's Air Quality Implementation Plan.

Wyoming

The noxious weed control program in Wyoming is administered by BLM and the Wyoming State Department of Agriculture through a cooperative agreement. The agreement provides that the BLM Districts and the Wyoming weed and pest control districts will enter into contracts where the program is needed and funds are available. The Wyoming weed and pest control districts do the actual weed control work and are reimbursed by the BLM Districts through the contract. Wyoming State Department of Agriculture instituted Wyoming's Herbicide Monitoring Program in 1977. It was instituted to protect the health and environment and to ensure the program met all federal and state standards. Records are available covering the program activities from 1977 through 1984.

County weed control officials and BLM district and resource area representatives meet at least annually concerning the proposed control action for that year. At these meetings, all safety and environmental concerns for the proposed treatments are reviewed and needed restrictions addressed.

The Wyoming Game & Fish Department, by state statue, manages all wildlife in Wyoming, including those on BLM lands. Because BLM manages wildlife habitat on the lands it administers, cooperation on all factors affecting wildlife populations or habitat is coordinated through a memorandum or understanding with the department.



Yellow Starthistle

The National Clean Water Act and state regulations mandate the protection or enhancement of the water quality of all waters in Wyoming. The Wyoming State Department of Environmental Quality (DEQ) is responsible for ensuring compliance with water quality laws. BLM and the DEQ cooperate through a memorandum of understanding. Annual meetings are held on the requirements.

The State Department of Environmental Quality is also responsible for protecting the air resource within Wyoming. Permits are required before emitting any air pollutants. BLM works closely with DEQ and obtains all required permits before engaging in any action covered by the Clean Air Act.

Private Landowners

Because private landowners are highly interested in BLM operations near their land, BLM strives to keep adjacent landowners informed about its noxious weed operations. Before preparing environmental documents at the state or district level, BLM invites interested landowners to comment on proposed programs. Before applying aerial herbicides, BLM informs local newspapers and all residents and contiguous landowners within a half-mile of spray sites.

Chapter 2—Description of the Affected Environment

This Chapter provides a basis for assessing the impacts of the alternatives. Information is provided commensurate with the importance of impacts, with less important material summarized or simply referenced. More detailed descriptions of the affected environment are presented in local resource management plan, timber management plan, and grazing management plan EISs, which can be inspected at respective district offices. Other references are cited within the text by author and date of publication. A listing of these references appears in the References section.

Climate and Air Quality

The climate of the western portion of the EIS area is heavily influenced by Pacific maritime air masses, which result in moist, mild winters and dry, moderately warm summers. By the time the maritime air mass reaches the central portion of the EIS area, it is influenced by drier, continental Great Basin air. This condition results in hot, dry summers and cold winters. Continental polar air dominates the eastern portion of the EIS area, resulting in hot summers and long, cold winters.

Average annual precipitation ranges from 60 to 200 inches in the Cascades and coastal mountains to 10 inches in the northern Great Basin and 12 to 16 inches in the northern Great Plains.

Because of complex topography across the EIS area, microclimates greatly vary.

Smoke instrusions from wood stoves sometimes results in particulate levels exceeding EPA standards in urban areas during periods of atmospheric stability.

Although air quality problems exist in urban areas such as Boise, Missoula, Portland, Eugene, Medford, and Spokane, air quality in the EIS area is good overall.

The Clean Air Act Amendments of 1977 contain provisions to ensure that air quality does not deteriorate in areas with clean air. Class I areas, such as National Parks and wilderness areas, allow virtually no deterioration. Most of the EIS area is Class II, which allows moderate deterioration of air quality.

Geology and Topography

The EIS area includes several physiographic divisions, all of which are based upon differing rock types and formations. Generally, the areas consist of complexes of volcanics of the Cascades, sediments of the Coast Range, and high lava and basin plains of eastern Oregon and Washington and southern Idaho. High massive mountains and volcanics dominate central Idaho and western Montana. Much of the high unglaciated plains of eastern Montana and Wyoming are underlain by sedimentary rock.

More detailed geologic and topographic information may be obtained from BLM state and district offices in the EIS area.

Soils

Variations in parent material, climate, and topography, over time, have resulted in many different soil types in the EIS area. The Great Plains of Montana and Wyoming have soils formed in glacial plains; sedimentary bedrock; and low terraces, fans, and flood plains. The northern Rocky Mountains have a complex of mountain soils, including the Idaho batholith and volcanics of the Yellowstone Plateau. Basin and range soils in portions of south Idaho and east Oregon and Washington generally occur on mountains and alluvial fans formed in mica schist, quartzite, and alluvium with some loess influence. The soils of the Snake River area occur on broad plains and plateaus with smaller areas of mountains and deep canyon lands. Western Oregon and Washington have the mountainous, volcanic soils of the Cascades and the high rainfall forest soils of the Coast Range.

Third order soil surveys have either been completed or are underway on most BLM lands in the EIS area. This information exists at BLM district offices in the EIS area.

Water Resources

Surface Water

The EIS area includes the entire range of moisture regimes, from the rain forests of west Oregon and Washington to the arid and semiarid rangeland of Idaho, Montana, and Wyoming. The area includes land on both sides of the continental divide with rivers flowing into the Pacific Ocean, Gulf of California, and Gulf of Mexico. The larger rivers include the Columbia, Snake, Missouri, Green, Yellowstone, Salmon, and Platte.

Rivers and streams in the rain forests are generally perennial and of good quality with low total dissolved solids (TDS). Streams in the rangeland areas vary from ephemeral to perennial, and TDS levels are normally high.

In western Oregon and Washington, the surface water is predominantly affected by the mild, moist climate. Most precipitation occurs as rain from November to March, but snow occurs at the higher elevations of the Cascade Mountains. Annual precipitation ranges up to 200 inches.

Idaho, Montana, Wyoming, and east Oregon and Washington have a somewhat variable moisture regime, but within the context of an arid to semiarid environment. Annual precipitation ranges from 6-8 inches in east Oregon and southcentral Wyoming to 40-45 inches in the higher elevations of Idaho and Montana. In these areas, most streamflow results from spring snowmelt, and local surges result from summer thunderstorms.

Surface water is an important resource throughout he EIS area. Large amounts are used by municipal, domestic, agricultural, and industrial users. Nonconsumptive uses include uses for isheries, recreation, aesthetics, hydropower generation, transportation, and water quality maintenance. BLM-administered lands contribute to or lie within many municipal watersheds.

Background data for the levels of herbicides in streams are sparse, but some data exist for western Oregon and Wyoming. U.S. Geological Survey (USGS) WATSTORE data (see Glossary) reveal that herbicides are generally not detectable in streamflow in western Oregon. In Wyoming, the USGS samples collected and analyzed during 1977 and 1978 detected picloram in 34.5 percent of the samples. These samples were collected from streams draining a large agricultural area. This sampling period may have had more intensive herbicide treatment than normal. The maximum concentration found was 0.18 micrograms/liter (ug/liter), much less than the EPA recommended 24-hour maximum for potable waters (Newton and Norgren 1977), and well below any harmful levels or fish, wildlife or crops. (Butler 1980).

Ground Water

Ground water quantity and quality in the EIS area ary greatly and are normally a direct product of the eologic formation in which the ground water riginates. The more productive areas are normally he alluvial deposits, but the Snake River basalt is lso a highly productive zone. In western Oregon, lluvial deposits may yield up to 500 gallons per minute. Most wells are less than 1,000 feet deep, nd shallow wells normally occur in alluvial eposits.

Ground water use is determined by the presence of good quality water at a depth that makes it economical to pump. In many areas, ground water is the only source for municipal, domestic, and agricultural uses.

The recharge areas are normally in the higher elevations, except for alluvial deposits, which may function as their own recharge area.

Vegetation

Wetlands and Riparian

Many noxious weeds occur in wetlands and riparian areas.

Wetlands occur along lakes, ponds, marshes, rivers, and streams. They are often inundated by water and normally have saturated or seasonally saturated soil conditions. Common wetland plants range from cottonwoods and willows to sedges and cattails. The width of wetlands may vary from a few feet along small streams to several hundred feet along major rivers. Because of the presence of moisture and abundant nutrients, wetlands are often the most productive areas for vegetation growth. They are valuable for wildlife habitat and often provide a large portion of the forage in grazing allotments.

In the arid or semiarid lands of the EIS area, wetlands make up a small percent of the total land surface. For example, wetlands account for only 1 percent of the land in BLM's Rock Springs District in Wyoming. The percentage of wetlands is larger in western Oregon and Washington and northern Idaho than in the rest of the EIS area.

Terrestrial Vegetation

Noxious Weeds and Poisonous Plants

Many noxious weeds and poisonous plants occur on 5 percent of the BLM administered lands in the EIS area and 7 percent of all land, public and private, in the five states. (See Table 1-1) In 1982 and 1983, an average of 6,077 weed-infested acres was treated annually with herbicides on BLM lands in the EIS area. In addition, biological control agents (insects) were used to treat approximately 11,000 acres in 1982 and 24,000 acres in 1983, mostly for tansy ragwort in Oregon. Noxious weeds treated include Canada thistle, hoary cress, leafy spurge, Russian knapweed, spotted knapweed, diffuse knapweed, dalmatian toadflax, common toadflax, common tansy, tansy ragwort, Dyers woad, rush skeletonweed, yellow starthistle, musk thistle, and scotch thistle. Appendix C lists the following information on noxious weeds: origin, life duration, annual estimated rate of spread, annual estimated reduction of carrying capacity, and species that have toxic effects on other plants. Appendix C also lists species that have been reported to have health hazards to humans or livestock. Appendix E shows the susceptibility of common weeds to control by four herbicides: 2,4-D, dicamba, picloram, and glyphosate.

Biological agents have been reported to control some noxious weeds. Sheep have been reported to control top growth of leafy spurge (Lacey and others 1983) and spotted knapweed (Kelsey 1984). Leafy spurge, however, is toxic to cattle and horses (Hulbert and Oehme 1961). See Appendix F for other biological agents that can be used for weed control.

In the EIS area, state and county weed control laws require the control of noxious weeds. Many noxious weeds spread rapidly once they become established in an area and are difficult and costly to control. When noxious weeds are not controlled on BLM lands within the EIS area, these infestations continue to be a source of possible infestations to other lands. All landowners within an area must cooperate to satisfactorily control weeds.

Land Resource Regions

Widely diverse vegetation communities occur in the EIS area, varying by climate, moisture, elevation, soils, and other environmental factors. These communities present a variety of concerns for noxious weed control. This section lists some of plant species occurring in the EIS area and by major land resource region (USDA, SCS 1981). Major land resource regions within the EIS area are shown on Map 2-1.

A - Northwestern Forest, Forage, and Specialty Crop Region. This region supports forest vegetation in many places, prairie vegetation in some places, and savanna vegetation in others. Western hemlock, western redcedar, Douglas-fir, and Sitka spruce are common, and grand fir grows in places. Also common are Pacific silver fir, noble fir, and western white pine, bigleaf sagebrush, ponderosa pine, sugar pine, incense-cedar, white fir, red fir, tanoak, California black oak, canyon live oak, and madrone. At higher elevations, mountain hemlock is an important part of the plant community, and subalpine fir and whitebark pine grow near timberlines.

Stands of cottonwoods and willows grow on overflow channels, streambanks, and islands. Oregon white oak is common in savannas, especially in Oregon. Red alder is an invader on disturbed sites in Western Oregon and Washington. Lodgepole pine is common along the coastal dunes.

Tree species in the southern part of the region include Port-Orford-cedar, California bay, madrone, tanoak, and golden chinkapin. Major shrubs and forbs include salmonberry, ladyfern, swordfern, rhododendron, California laurel (Oregon myrtle), willow, vine maple, huckleberry, sala, oxalis, violet, poison oak, ceanothus, manzanita, Whipplea, Oregon grape, Indian plum, snowberry, hazel, oceanspray, serviceberry, rose, and thimbleberry.

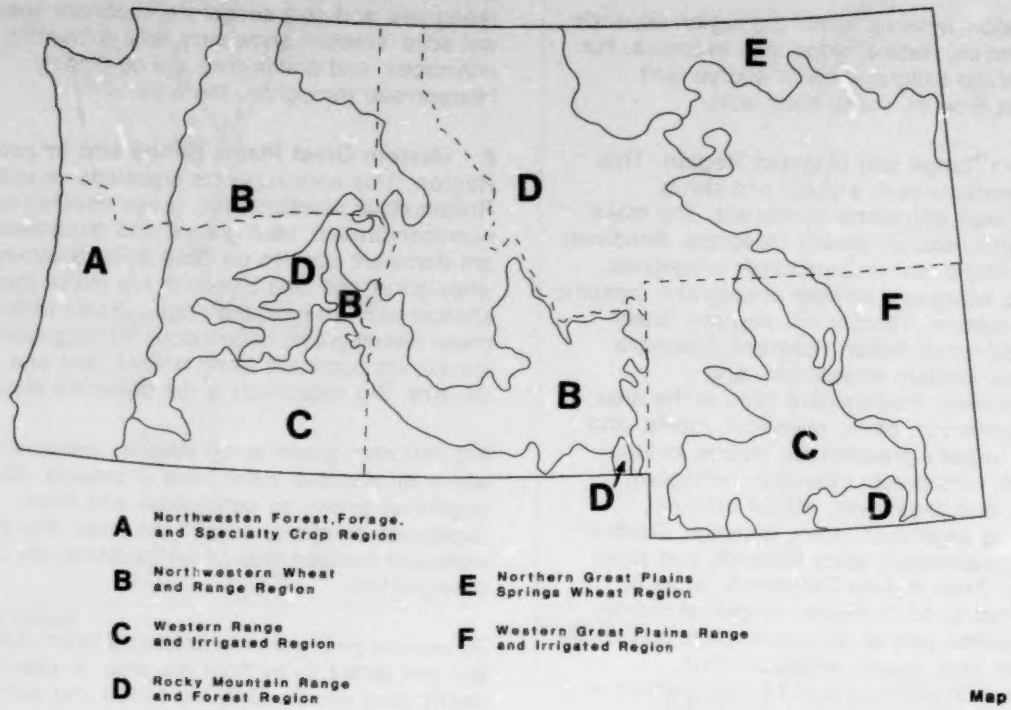
Red and western fescues, bromes, and sedges are common in the prairies and savannas. Blue wildrye, fescues, bluegrass, mountain brome, and some browse species occur in the understory in open stands of timber. Soft chess, wild oats, burclover, fescues, and bromes are major prairie species.

B - Northwestern Wheat and Range Region. This region supports conifer forests, shrub-grass, desert shrub, and grasses. Grand fir, western larch, and lodgepole pine have an understory of vacciniums and Menziesia. Pacific silver fir, mountain hemlock, subalpine fir, and whitebark pine grow at the highest elevations.

Curlleaf mountain mahogany, Douglas-fir, aspen, and Rocky Mountain juniper grow on high mountain slopes. Western juniper is common on the drier, stonier sites. Small stands of ponderosa pine, with oak on warmer sites along the Columbia River, are on north slopes, in canyons and draws, and along streams. Dwarf hardwoods of hackberry and maple also grow in canyons and draws. Snowberry is the most common shrub in the pine stands. Poison oak is the most common shrub in the oak stand.

Important shrubs of this region include big sagebrush, low sagebrush, stiff sagebrush, antelope bitterbrush, greasewood, Gardner saltbush, rabbitbrush, black sagebrush, rose, black hawthorn, and low Oregon grape. Shadscale, scarlet globemallow, Indian paintbrush, lupine, common cowparsnip, arrowleaf, phlox, tapertip hawksbeard, biscuitroot, penstemon, milkvetch, and lambstongue fawnlily are among the important forbs in the region.

Land Resource Regions for EIS Area


A
B
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F
A Northwesten Forest,Forage, and Specialty Crop Region
B Northwestern Wheat and Range Region
C Western Range and Irrigated Region
D Rocky Mountain Range and Forest Region
E Northern Great Plains Springs Wheat Region
F Western Great Plains Range and Irrigated Region

Map 2-1

Some of the important grasses in the region include Idaho fescue, Cusick bluegrass, bluebunch wheatgrass, Sandberg bluegrass, needleandthread, Thurber needlegrass, Indian ricegrass, Nevada bluegrass, prairie junegrass, oniongrass, and slender wheatgrass.

The vegetation variance within the region depends on soil moisture, texture, slope, and exposure. For example, inland saltgrass, basin wildrye, and greasewood grow on saline-alkali soils.

C - Western Range and Irrigated Region. This region is predominately a grass and shrub vegetation area with some woodlands. The major grass species include Nevada bluegrass, Sandberg bluegrass, Idaho fescue, bluebunch wheatgrass, cheatgrass, wiregrass, slender wheatgrass, creeping wildrye, bluegrass, Thurber needlegrass, basin wildrye, squirreltail, Indian ricegrass, Columbia needlegrass, western wheatgrass, and needleandthread. Predominant forbs in the area include penstemon, phlox, milkvetch, lupine, and aster. The region's predominant shrubs include rabbitbrush, bitterbrush, mountain mahogany, shadscale, bud sagebrush, Nuttall saltbush, winterfat, big sagebrush, spiny hopsage, Gardner saltbush, greasewood, spiny hopsage and silver sagebrush. Trees include Douglas-fir, white fir, California red fir, Utah juniper, singleleaf pinyon, Rocky Mountain juniper, lodgepole pine, ponderosa pine, limber pine, aspen, whitebark pine, Englemann spruce, subalpine fir, and bristlecone pine.

D - Rocky Mountain Range and Forest Region. This area supports forests on upper slopes, alpine tundra above timberline, conifer forests, aspen, grasses, mountain shrub and sage brush-grass vegetation. Major tree species include western white pine, ponderosa pine, lodgepole pine, western redcedar, western larch, hemlock, Douglas-fir, subalpine fir, whitebark pine, Rocky Mountain juniper, Englemann spruce, limber pine, bristlecone pine, white fir, and pinyon. Blue spruce, narrowleaf cottonwood, willow, aspen, alder, and birch trees are also common. The area's predominant shrubs are common snowberry, skunkbush sumac, big sagebrush, Gambel oak, curlleaf and birchleaf mountain mahogany, serviceberry, chokecherry, and antelope bitterbrush. Major grass species include bluebunch wheatgrass, rough fescue, Idaho fescue, Alpine grasses, bearded wheatgrass, blue wildrye, mountain brome, gramas, needlegrasses, bluegrasses, and sodforming wheatgrasses.

E - Northern Great Plains Spring Wheat Region. This area supports natural prairie vegetation. Western wheatgrass, blue grama, needleandthread, and green needlegrass are dominant species. Prairie sandreed and little bluestem are important species on the very shallow soils. Buffaloberry, chokecherry, and prairie rose are common in draws and narrow valleys.

Little bluestem is an important species on sloping and thin soils. Prairie cordgrass, northern reedgrass, and slim sedge are important species on wet soils. Western snowberry, stiff goldenrod, echinacea, and prairie rose are commonly interspersed throughout the area.

F - Western Great Plains Range and Irrigated Region. This area supports grassland vegetation. Rhizomatous wheatgrasses, green needlegrass, needleandthread, blue grama, and threadleaf sedge are dominant species on deep soils. Bluebunch wheatgrass and little bluestem are major species on shallow soils on hills and ridges. Basin wildrye, green needlegrass, rhizomatous wheatgrasses, and shrubs are dominant along bottom land and streams. Big sagebrush is the dominant shrub.

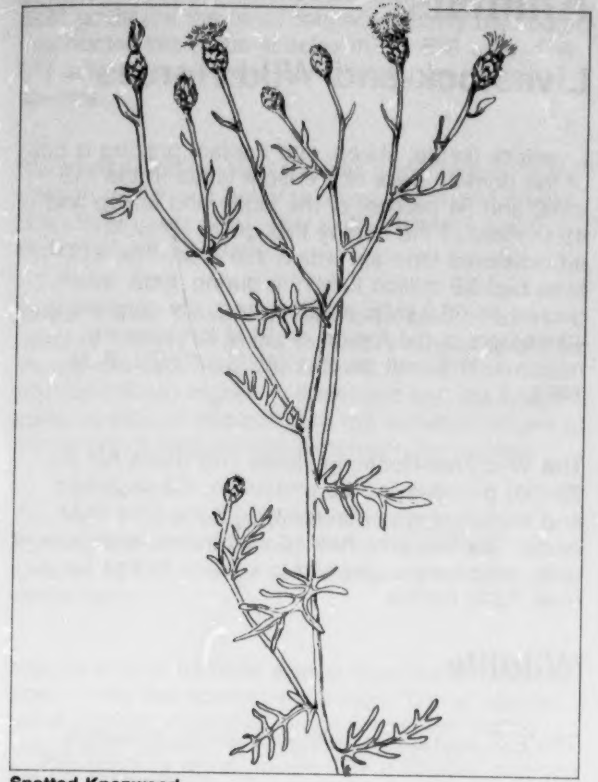
Big bluestem grows along streams, especially where an effective water table is present. Sand sagebrush grows on sandy soils and silver sagebrush on clayey soils in the west. The eroded walls and escarpments of the badlands are devoid of vegetation.

Ponderosa pine grows in scattered open stands. Bur oak grows throughout the area, in places in nearly pure stands. Quaking aspen and eastern hophorn beam are scattered throughout the forests. Green ash and American elm are scattered along the draws.

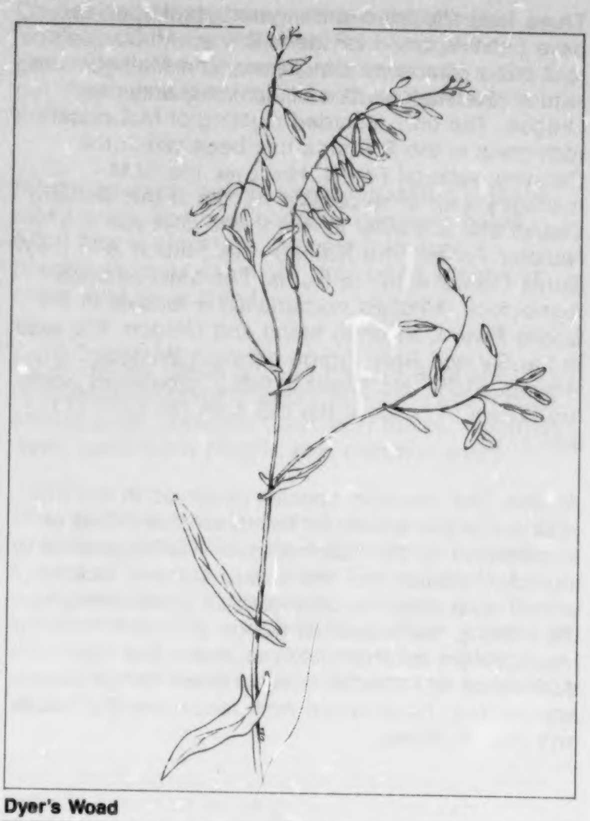
Black Hills spruce grows at higher elevations and along major drainageways. Paper birch and quaking aspen grow on sites burned by wildfire. Kentucky bluegrass, poverty oatgrass, Richardson needlegrass, and Canada wildrye are common under open forest stands, and cottonwood trees are common along the major drainageways.

Threatened, Endangered, and Sensitive Plants

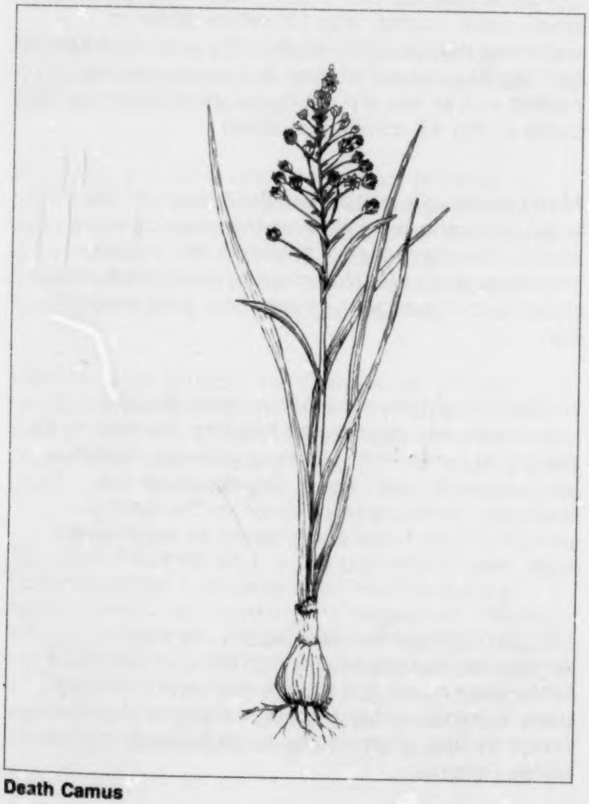
Endangered plants are species in danger of extinction throughout all or a significant portion of their range. Threatened plants are not now endangered but are likely to become so within the foreseeable future throughout all or a significant portion of their range. Sensitive plants (see Glossary) are species not yet officially listed but undergoing a status review.



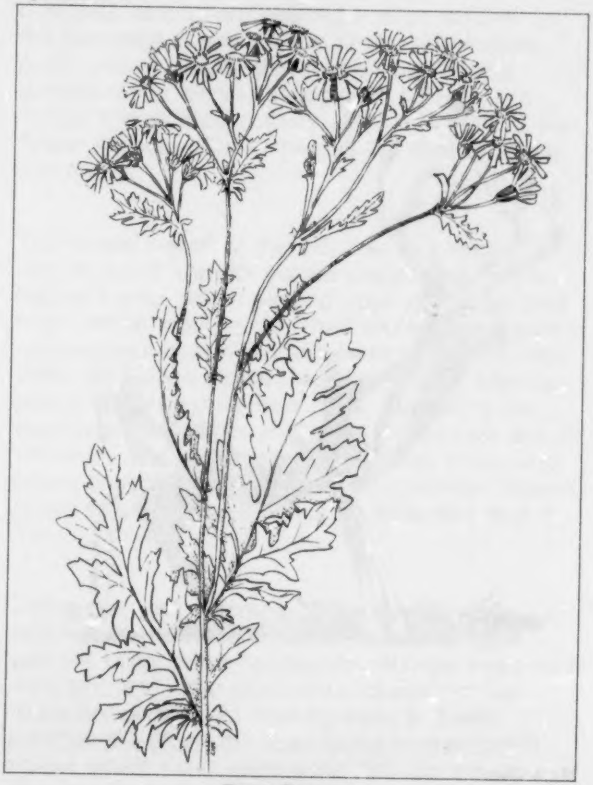
Spotted Knapweed



Dyer's Woad



Death Camus



Tansy Ragwort

Three federally-listed endangered plant species have been reported for the EIS area. McDonald's rock-cress *(Arabis mcdonaldiana)* and Malheur wire-lettuce *(Stephanomeria malheurensis)* occur in Oregon. The only recorded sighting of McDonald's rock-cress in the EIS area has been within the Siskiyou National Forest. However, the BLM manages a lot of serpentine habitat in the Medford District that is similar to that in the Siskiyou National Forest. The Malheur wire lettuce is in the Burns District south of Burns. The MacFarlane;s four-o'clock *(Mirabilis macfarlanei)* is located in the Snake River Canyon in Idaho and Oregon. It is also in the Salmon River Gorge between Whitebird and Riggins, Idaho. No federally listed threatened plants are known to occur in the EIS area (50 CFR 17.11 and 17.12).

At least 268 sensitive species observed in the EIS area are under review for listing as threatened or endangered by the U.S. Fish and Wildlife Service or individual states. The final status of these species will be determined as enough data is collected. In the interim, these species will be protected from management activities likely to jeopardize their survival on BLM lands. A list of these sensitive species may be obtained from respective BLM state and district offices.

Mule Deer

Animals

Livestock and Wild Horses

Livestock (cattle, sheep, and horses) grazing is one of the primary uses of the BLM lands in the EIS area, and 54 percent of the cattle and sheep and 48 percent of the horses that graze on BLM-administered land are within this area. The EIS area had 3.9 million livestock during 1983, which grazed on 56.2 million acres, annually consuming 43 percent of the forage on BLM lands or 6.6 million animal unit months (AUMs) (USDI, BLM 1984).

The Wild Free-Roaming Horse and Burro Act (PL 92-195) provides for the protection, management, and control of wild free-roaming horses on BLM lands. The EIS area has 46 wild horse management units, which were planned to provide forage for at most 6,612 horses.

Wildlife

The EIS area encompasses a variety of wildlife habitats, including 45.2 million acres of important big-game habitat, 42.8 million acres of important small-game habitat, and 1.8 million acres of waterfowl habitat. Wildlife diversity and abundance and the occurrence of rare or unique species and habitat values are among the highest found on BLM lands in the 48 contiguous states.

Many mammals inhabit the BLM lands of the EIS area, including the following big-game species: Rocky Mountain sheep, antelope, elk, moose, mountain goat, blacktailed deer, whitetailed deer, mule deer, black bear, grizzly bear and mountain lion.

Pronghorn antelope occur on lower elevation sagebrush and grasslands habitats. Pronghorn are mainly browsers that utilize sagebrush, rabbitbrush and sagewort year round. Sagebrush is the mainstay, particularly in winter. In the spring, pronghorn eat forbs and grasses to supplement their diet.

Elk occur on conifer and higher elevation sagebrush and grassland habitats. Elk use BLM lands year round but mostly from winter through early summer. Crucial spring calving and winter range habitat often occurs on BLM lands next to valley bottoms.

Blacktailed deer, whitetailed deer, and mule deer on BLM lands are the most common, widely distributed and hunted big game species in the EIS area. The EIS area provides year-round habitat for these species.

Blacktailed and whitetailed deer occur mainly in the iparian deciduous bottoms along rivers and creeks. Blacktailed deer occur only in the extreme western portion of the EIS area.

Moose mainly inhabit the willow-covered stream bottoms leading from the mountain ranges and also occupy the aspen-conifer foothills. In winter, moose populations are higher in drainages and low-lying areas as moose migrate from the summer ranges of he upland meadows and aspen-conifer regions.

The use of BLM lands by mountain goats and barbary and bighorn sheep varies seasonally but nvolves summer range, crucial spring lambing, and winter range.

mportant bear habitats extend from the mountains down along the riparian waterways. These riparian areas provide important forage and cover during spring and summer and can be important when berries ripen in the fall.

Mountain lions usually occur in areas of high ungulate concentrations. Little is known of their population levels or densities.

The sage grouse is one of the most prominent game birds of the EIS area. It typically inhabits sagebrush areas with some vegetation diversity and a water supply. Forbs are a critical habitat component for virtually all upland game birds during the spring and summer months.

Like the sage grouse, the sharp-tailed grouse nhabits sagebrush grasslands near brushy stream bottoms and along the edges of pine-covered breaks and ridges. Sharp-tailed grouse require good brush cover for nesting and early brood protection.

The blue, Franklin, and ruffed grouse occupy imbered areas in mountainous regions having aspen, conifer, and streamside vegetation. Franklin and ruffed grouse occupy a similar habitat season ong. Blue grouse occupy aspen and willow thickets of the foothills and mountain valleys during the ummer and migrate to the higher elevation coniferous forests and ridges in the winter.

Chukar and Hungarian partridge habitats are isolated within the EIS area. Suitable habitat generally occurs where steep slopes with rocky outcroppings are combined with badland creek bottoms.

Ring-necked pheasants usually inhabit croplands along creek and river bottoms, generally below 5,000 feet in elevation. In some instances, pheasants occur in brushy draws and sagebrush areas next to cropland.

Other upland game birds in the EIS area are the whitetailed ptarmigan, valley quail, mountain quail, scaled quail, bobwhite quail, wild turkey, mourning dove, band-tailed pigeon, and common snipe.

Most of the EIS area's waterfowl are migrant, short-term occupants, following the Central and Pacific flyways during spring and fall. Some waterfowl overwinter near unfrozen water. Nesting waterfowl species of the EIS area include mallard, goldeneye, American widgeon, Canada goose, teal, gadwall, pintail, shovellers, ring-necked mergansers, and the lesser scaup.

Many stock ponds, reservoirs, streams, and rivers provide extensive acreage of shoreline and riverbank nesting and feeding habitat required for the existence of shore birds. Great blue herons, gulls, grebes, snipe, lesser yellowlegs, willets, avocets, terns, upland sandpipers, killdeer, and northern long-billed curlews all nest in the EIS area. These species migrate through the area in spring and fall.

The central region of the EIS area is a winter concentration area for golden eagles and rough-legged hawks, which depend upon rabbits as their major winter food source. Bald eagles congregate in winter roosts near rivers and lakes in the EIS area. Bald and golden eagles, redtailed hawks, kestrels, prairie falcon, Ferruginous hawk, burrowing owl, osprey, marsh hawks, and great-horned owls are all known to nest in the area. The turkey vulture and falcon are also common summer residents. Ravens, crows and other large nongame birds also nest in the EIS area.

Cliff areas, rock outcrops, and shrubs provide nesting sites for most of these raptors. In open country, utility poles, fenceposts, isolated trees, rock outcrops, and other isolated structures provide important perches for hunting raptors. These perches are often well used along transportation routes where traffic-killed small animals are an attractive food source.

Many seed-eating and insectivorous birds inhabit riparian and upland vegetation zones, but little information exists on their densities, distribution, and limiting factors in the EIS area. Woodpeckers and other cavity-nesting birds depend on dead trees (wildlife trees) for their existence.

Fish

Many game fish species inhabit the EIS area, including salmon, steelhead, cutthroat trout, rainbow trout, brown trout, dolly varden, brook trout, lake trout, California golden trout, grayling, walleye, northern pike, paddlefish, sturgeon, smallmouth bass, largemouth bass, whitefish, perch, ling, crappie, and catfish.

Trout spawn both in major rivers and tributary streams. In the EIS area the estimated range of spawning and the time when eggs, alevin, and swim-up fry are present for game fish species are grouped according to season of spawning, fall and spring. Rainbow and cutthroat trout spawn in the spring from April 1 to June 15, and the eggs, alevin, and swim-up fry are present from April 1 to July 30. Fall spawners, brook and brown trout, spawn from October 1 to November 15, and eggs, alevin, and swim-up fry are present from October 1 through April 30.

Threatened and Endangered Animals

Twenty-five animal species in the EIS area (Table 2-1) are officially listed by the U.S. Fish and Wildlife Service or the states of Idaho, Montana, Oregon, Washington, or Wyoming as threatened, endangered, or proposed in the Federal Register for designation as threatened or endangered (50 CFR 17.11 and 1712).

In addition, at least 134 wildlife species are listed as special interest or sensitive species by individual states within the EIS area.

Cultural Resources

Federal agencies have been charged with responsibility for managing cultural and paleontological resources on lands under their jurisdictions. Through a group of laws beginning with the Antiquities Act (1906) (Chap. 3060), BLM has been mandated to identify, protect, and enhance such resources on public lands.

Surveys of existing cultural resource information (Class I inventories) have been completed for each BLM district and may be examined in the BLM district offices.

Many archaeological, historical, and paleontological sites have been found on or near BLM-administered land in the EIS area. Some of the information has been lost from all of these sites as a result of natural or human disturbances before discovery. Future intensive surveys are certain to locate many more sites. Most identified archaeological sites appear to have been small, seasonally used campsites. Most historical sites relate to early settlement, transportation, mining, and logging. Paleontological resources in the EIS area include many vertebrate, invertebrate, and plant fossil sites. Lists and descriptions of known paleontological sites on or near BLM lands are maintained by BLM district offices. All reports of fossil-bearing deposits are examined by specialists to avoid destroying important fossils.

Visual Resources and Recreation

Visual resources consist of the land, water, vegetation, animals, and other natural or constructed

Table 2-1. Threatened and Endangered Animals in the EIS Area

	State Status/Occurrence					
Species	**Federal Status**	**Idaho Status**	**Montana Status**	**Oregon Status**	**Washington Status**	**Wyoming Status**
Mammals						
Grizzly bear, *Ursus arctos horribilis*	T	T	T	-	T	T
Woodland caribou, *Rangifer tarandus caribou*	E	E	E	-	E	-
Black-footed ferret, *Mustela nigripes*	E	-	E	-	-	E
Wolverine, *Gulo gulo*	-	-	-	T	-	-
Columbia white-tailed deer, *Odocoileus virginianus leucurus*	E	-	-	E	E	-
Southern sea otter, *Enhydra lutris nereis*	T	-	-	T	E	-
Gray wolf, *Canis lupus*	E	E	E	-	E	E
Pygmy rabbit, *Sylvilagus idahoensis*	-	-	-	-	T	-
Birds						
Peregrine falcon, *Falco peregrinus tundrius*	T	-	-	E	E	-
Peregrine falcon, *Falco peregrinus anatum*	E	E	E	E	E	E
Bald eagle, *Haliaeetus leucocephalus anascanus*	E/T	E	E	T	T	E
Whooping crane, *Grus americana*	E	E	E	-	-	E
Northern spotted owl, *Strix occidentalis caurina*	-	-	-	T	T	-
Short-tailed albatross, *Diomedea albatrus*	E	-	-	-	-	-
California condor, *Gymnogyps californianus*	E	-	-	-	-	-
Brown pelican, *Pelecanus occidentalis*	E	-	-	E	E	-
Aleutian Canada Geese, *Branta canadensis leucopareia*	E	-	-	E	E	-
White pelican, *Pelecanus erythrorhynchos*	-	O	O	O	O	O
Sandhill crane, *Crus Canadensis*	-	O	O	O	E	O
Snowy Plover, *Charadrius alexandrinus*	-	-	-	T	E	E
Upland sandpiper, *Bartramia longicauda*	-	-	-	-	E	-
Ferruginous hawk, *Buteo regalis*	-	O	O	O	O	E
Amphibians						
Western spotted frog, *Rana pretiosa*	-	-	-	T	-	-
Wyoming toad, *Bufo hemniophrys baxteri*	E	-	-	-	-	E
Western pond turtle, *Clemmys marmorata*	-	-	-	-	T	E
Fish						
Bonytail chub, *Gila elegans*	E	-	-	-	-	E
Borax Lake chub, *Gila boraxobius*	E	-	-	E	-	-
Humpback chub, *Gila cypha*	E	-	-	-	-	E
Kendall warm springs dace, *Rhinichthys osculus thermalis*	E	-	-	-	-	E
Colorado squawfish, *Ptychocheilus lucius*	E	-	-	-	-	E
Hutton Tui chub, *Gila bicolor*	T	-	-	O	-	-
Foskett speckled dace, *Rhinichthys osculus*	T	-	-	O	-	-
Warner sucker, *Catostomus warnernesis*	P	-	-	O	-	-
Insects						
Oregon silverspot butterfly, *Speyeria zerene hippolyta*	T	-	-	O	T	-

T = Threatened
P = Proposed for designation as threatened or endangered
E = Endangered
O = Occurrence in state/Protected

features visible on public lands. Highways, rivers, and trails of the five states pass through a variety of characteristic landscapes where natural attractions such as waterfalls can be seen and where cultural modifications exist. To enable visual resources to be considered when planning weed management, public lands have been assigned visual resource management (VRM) classes according to scenic quality, sensitivity level, and distance zone criteria. VRM classes provide objectives designed to mitigate adverse impacts of land management practices on scenic values (BLM Manual 8400). VRM maps and narratives derived from inventories and evaluations of visual resources on public lands may be examined in respective BLM district offices.

Among the outdoor recreation activities occurring on BLM lands in the EIS area are sightseeing, picnicking, camping, fishing, and hunting. Other popular activities are off-road vehicle use, horseback riding, river floating, and the studying of natural features. Some of these activities, such as camping and picnicking, occur at recreation sites that have noxious weeds. Table 2-2 shows annual recreation visits on BLM lands. Detailed information on recreational use of public lands may be obtained at BLM district offices.

Wilderness and Special Areas

The EIS area contains five designated wilderness areas totalling 19,700 acres and 224 wilderness study areas (WSAs) totalling 5,221,500 acres. The EIS area also has many designated or proposed special areas such as areas of critical environmental concern (ACECs), natural areas, scenic waterways, and scenic trails.

Economic Conditions

The five states in the EIS area are presented as the regional economy that would be affected by the Proposed Action or alternatives. The five states had a 1980 population of 8.9 million, a 24 percent increase over the 1970 population. Table 2-3 shows population fluctuations over the past three decades, and Table 2-4 shows income and employment for the EIS area.

BLM administers roughly 52 million of the region's 312 million acres, or 17 percent of the land base (USDI, BLM 1984). The average annual cost of controlling weeds on BLM land in the EIS area in 1982 and 1983 amounted to $344,000.

Several studies have reported estimates of the magnitude of losses from noxious weeds on all lands, both public and private.

The annual forage loss on all lands to range users caused by spotted knapweed alone is estimated at $4.5 million in Montana (Bucher 1984). A University of Idaho study estimated the annual economic loss from weeds in Idaho to exceed $500 million (Lewiston Morning Tribune 1980). In illustrating potential economic losses, Pehallegon (1983) estimated $19.5 million in economic losses from 4.5 million acres of weed-infested range lands in Washington State.

Economic losses from poisonous plants occur on

Table 2-2. Annual Recreation Visits on BLM-Adminstered Lands, 1983

	Ore.	Wash.	Idaho	Mont.	Wyo.	Total
Hunting	862,800	2,400	6,286,400	579,400	4,063,000	11,794,000
Fishing	813,600	12,600	404,800	786,000	285,200	2,302,200
Camping	419,625	4,000	543,125	393,750	441,625	1,802,125
Boating	565,750	21,000	550,750	204,250	1,261,250	2,603,000
O.R.V.	95,250	57,000	267,750	596,500	667,750	1,684,250
Other	1,818,750	13,000	1,010,750	1,823,250	1,477,250	6,143,000
Total						26,328,575

Recreation Visit: A visit, whether for a few minutes, a full day, or more, to BLM-administered lands and waters by a person to engage in any recreation activities, except those part of or incidental to the pursuit of a gainful occupation.

Source: USDI, BLM 1984.

Table 2-3. Population, 1960-1980

	1960	1970	1980
Idaho	667,191	713,015	943,935
Montana	674,767	694,409	786,690
Oregon	1,768,687	2,091,533	2,633,105
Washington	2,853,214	3,413,244	4,132,156
Wyoming	330,066	332,416	469,557
Region	6,293,925	7,244,617	8,965,443
United States	179,323,175	203,235,298	225,504,825

Source: U.S. Dept. of Commerce, Bureau of the Census 1980.

public lands in the EIS area. Data adapted from Nielson (1978) shows the annual estimate from mortality and reduced calving or lambing would amount to $12 million annually on lands of all ownerships:

Cattle - 1 percent mortality of adult animals ($250/head) - $3,827,000

Cattle - 1 percent reduction in calf crop ($160) - $2,449,300

Sheep - 3.5 mortality of adult animals ($50/head) - $4,230,600

Sheep - 1 percent in reduction in lamb crop ($45/head) - $1,631,800

These estimates are based on the asumption that some degree of poisonous weed control is accomplished.

Social Environment

The social environment affected by BLM's weed control program includes individuals; the companies and businesses they work for; the communities, organizations, and groups they have formed; and their agencies and institutions of government. The social environment also includes attitudes, opinions, and perceptions about weed control policies and practices. For this EIS, BLM did not undertake a detailed social analysis of the EIS area that included a population profile, demographic analysis, institutional analysis, or formal public opinion survey. During the past several years, however,

Table 2-4. Employment and Personal Income, 1982

	Idaho	Montana	Oregon	Washington	Wyoming	United States
Employment by Source (Thousand Employees)						
Totals [1]	416	367	1,168	1,925	266	106,068
Proprietor						
Farm	27	24	41	44	9	2,723
Non Farm	43	42	120	154	23	7,473
Wage and Salary						
Farm	23	10	27	48	6	1,321
Non Farm						
Agricultural Services	5	2	10	16	2	591
Mining	4	9	2	3	35	1,124
Construction	14	13	29	73	19	3,875
Manufacturing	48	21	186	287	9	18,856
Transportation & Public Utilities	19	23	56	88	18	5,082
Wholesale Trade	22	17	62	98	10	5,321
Retail Trade	54	55	176	279	38	15,204
Finance, Insurance, and Real Estate	15	14	58	92	8	5,500
Services	64	62	200	335	36	20,415
Government						
Federal, Civilian	12	13	29	66	7	2,909
Federal, Military	9	8	10	95	6	2,630
State and Local	57	54	162	247	40	13,044
Total Personal Income (Thousand $)	8,710	7,680	27,350	49,110	6,210	2,751,520
Per Capita Income ($)	8,937	9,[illegible]44	10,231	11,466	12,211	11,100

[1] Consists of wage and salary jobs (full and part-time) plus number of proprietors.

Source: U.S. Department of Commerce, Regional Economic Information System, Bureau of Economic Analysis 1984.

BLM has conducted studies in the EIS area, with extensive public involvement, for several EISs and many environmental assessments. The following description of the social environment that could be affected by BLM's weed control program is based on that information and on concerns expressed.

In addition to direct impacts on jobs and personal income, certain social aspects of employment might be affected by BLM's programs: the importance of certain types of jobs to specific communities, dependence on particular jobs, availability of alternative jobs, access to jobs, and a community's level of acceptance of certain types of work. For example, some people highly depend on a certain type of work; for some people, alternative jobs do not exist, access to alternative jobs is limited, or alternative jobs are perceived as inappropriate work. The social effects of job losses are more significant for these people than for those who are flexible and have access to alternative jobs.

A significant social issue related to BLM's weed control program is public disagreement about the use of herbicides and the effectiveness of alternative treatments. Opponents of herbicide use perceive a BLM bias in favor of herbicides. The opponents see BLM as an advocate of herbicide use, defending that position rather than seeking public input to the process of decisionmaking. The proponents see BLM abandoning what they believe to be a demonstrably safe and effective means for controlling noxious weeds.

The controversy has opposing factions whose points of view are sometimes unaffected by the other side's perceptions of data. The full extent and intensity of the controversy among the people of the EIS area are not known.

On one side of the controversy the uncontrolled spread of noxious weeds is also a concern. Some are concerned with (1) the spread of noxious weeds from BLM lands onto private, state, and other public land; (2) the economic losses from this encroachment; and (3) the effects of noxious weeds on native vegetation. Public interest also exists in cooperative programs of weed control. Concern over the spread of noxious weeds is expressed by county and state laws enacted to control noxious weeds.

The controversy is sustained by the following four factors. First, EPA has approved the chemicals for use and has provided instructions for safe handling and application. For some people this is the whole story. They see no basis for opposition to herbicide use and they also see no reason for BLM to limit herbicide use or to entertain observations that the herbicides used for controlling weeds are used more often and in larger amounts for agriculture and home use then for noxious weed control.

Another factor is that some people are suspicious of the accuracy of EPA's determinations about herbicides. They fear that the approved herbicides may eventually be found to be as dangerous as other substances previously thought to be harmless. By then, they reason, it will already be too late to avert at least some harmful consequences.

A third factor that sustains the controversy is the difficulty in establishing scientifically, in a way that is comprehensible and believable to concerned individuals and interest groups, either the presence or the absence of cause and effect relationships between herbicide use and environmental damage or between exposure to herbicides and human health problems. This complicated scientific situation is important in three ways. In some cases (especially concerning long-term effects), the scientific evidence may simply be inconclusive. Therefore, questions concerning the effects of using a particular chemical, though they appear to be scientific questions, may have to be answered today in social and political terms. Conclusive scientific analyses may not be completed for years. Also, some segments of the public may distrust or reject sound scientific conclusions because they cannot understand the analytical process leading to the conclusions or because they have come to consider all scientific studies concerning herbicides to be inconclusive or dubious. Finally, some people criticize the fact that many studies of the health effects of herbicides are based on research with laboratory animals whereas their direct experiences of perceived impacts on people and wild and domestic animals seem to be ignored. A more extreme manifestation of this problem arises when parties to the controversy do not even agree on the identification of credible sources of information and analysis or on the definition of legitimate scientific research.

A fourth factor that helps sustain the controversy about herbicide use is that some people are increasingly concerned about not having control over their larger environment, including the management of BLM land resources. There is a growing sense that the nonprofessional public has a legitimate interest in how these land resources are managed. A traditional attitude of "leaving resource management to the professionals" is becoming less prevalent, and increasing numbers of people seem to want some say in how professionals do their job.

Just as social factors are linked to economic conditions, social factors are linked to other components of the environment such as air and water quality, rare and endangered plants, wildlife and recreation, and human health and public safety issues. For example, some are concerned about the safety of workers and the health of those directly or indirectly exposed to chemicals, with or without awareness of the exposure. Some are also concerned about contamination of water sources that are eventually used for irrigation, stock watering, domestic water supply, and fish hatcheries. These fears and anxieties appears to be directly related to the perception of scientific uncertainty about the existence of health risks.

Chapter 3—Environmental Consequences

Chapter 3 compares environmental consequences (impacts) of four alternatives to the existing environment as described in Chapter 2 and analyzes the significant impacts resulting from implementing each alternative in relation to these baselines. (Table 1-4 compares composite impacts of each of the four alternatives.) Analysis, including the scoping process, reveals that the proposed program for controlling noxious weeds would not significantly affect climate, geology, topography, minerals, utilities, communication sites, paleontological resources, energy requirements, or prime or unique farmlands. Therefore, these topics are not discussed. No irreversible or irretrievable commitments of resources would be involved in implementing the proposed program.

Basic assumptions of the analysis in Chapter 3 include the following: (1) that BLM will have the funding and personnel to implement the final decision, (2) that all design features described in Chapter 1 and Appendix I will be applied, and (3) that the types and amounts of treatments will be applied as shown in Table 1-2. The program is intended to be in effect for 10 to 15 years.

In this EIS, short term and long term are defined as follows:

Short term: the 10-year period following the initial implementation of a noxious weed program.

Long term: beyond the 10-year period.

Impacts on Air Quality

The major impacts on air quality in the EIS area would be increases in particulates and visible smoke from weed burning. Because the Proposed Action's average annual program (Appendix H) proposes 600 acres/year for burning in the entire EIS area, particulates and visible smoke would only slightly increase. Particulate emissions from weed burning would be highest under Alternative 3 (No Herbicide Use), which calls for burning 910 acres/year, and would be eliminated under Alternative 4 (No Action). Because weed burning will normally be done during periods of instability, the National Ambient Air Quality Standards (see Glossary) for particulate concentrations are not expected to be exceeded, even in nonattainment areas, under any alternative.

Although burning would be conducted so as to protect population centers and Class I areas from smoke, unforecasted weather changes could cause smoke to reach these locations. The probability of such an occurrence is extremely low because so few acres are proposed for burning.

The air also serves as a carrier of spray drift from both helicopter and ground vehicle spraying. Liquid spray droplets most prone to drift are usually 100 microns or less in diameter (spray equipment is designed to produce 200 micron droplets). For herbicides applied aerially in a 5 mile per hour (mph) wind, concentrations of spray that drift 100 feet downwind are about 1 percent of those onsite (USDI, BLM 1983).

Although herbicide applications result in vapor losses, commercial uses have not shown volatility to lead to phytotoxicity (see Glossary) in nontarget plants (NRCC 1974). Loss from volatilization is reported to be negligible with glyphosate (Weed Science Society of America, 1983). Volatilization will depend on the formulation of 2-4,D, with acids and amines being less volatile than esters, which vary from high to low. The oil soluble amines are considered to be least volatile. Dicamba may volatilize from soil surfaces but further study is required to determine the extent of such losses. Herbicides could be moved out of the target area while adsorbed to dust particles carried by wind. Once in the air, spray droplets are also subject to photodecomposition (see Glossary) by sunlight.

Impacts on Soils

Soils could be adversely affected by mechanical treatment including burning and chemical treatment.

Removal of solid stands of noxious weeds by chemical treatment may result in short-term insignificant increases in surface erosion that would be mitigated as vegetation reoccupies the treated site.

The behavior of a chemical substance in soil is determined by several properties relating both to the chemical and to the soil environment. The behavior in the soil environment of herbicides proposed for use is summarized in Table 3-1 and discussed below. Impacts on soils from herbicide applications would be greatest under Alternatives 1 and 2 but nonexistent under Alternatives 3 and 4.

The persistence of 2-4,D has been studied in a variety of soil types and under a wide range of environmental and laboratory conditions. Persistence of 2,4-D in most soils is short and is generally less than 1 month (Ashton 1982). Norris (1983) found the half-life of 2,4-D in soil to be 1 - 4 weeks with little potential for bioaccumulation. In general, 2,4-D is relatively mobile in soil compared with other herbicides (Ghassemi and others 1981). Microbial degradation (see Glossary) is the major mechanism by which 2,4-D is lost from the soil, especially under warm moist conditions with high soil organic matter—conditions that stimulate the growth of microorganisms. 2,4-D is not thought to leach into streams (Norris 1981) because it is adsorbed to soil organic material and rapidly degraded by soil microorganisms. Only minor losses of 2,4-D activity occur due to photodecomposition and, for most formulations, due to volatilization (see Glossary).

The fate of picloram in soil is determined by several factors, including volatilization, photodecomposition, adsorption and leaching, runoff, and chemical and microbial degradation. Volatilization is not considered a major determinant of environmental fate because of the low vapor pressure of picloram.

Picloram is degraded by natural sunlight and ultraviolet light, although the extent of photodecomposition under field conditions has not been measured.

Picloram is generally considered to be a mobile herbicide because its adsorption to soil particles is low. The mobility of picloram is less in soils high in organic matter.

Preliminary studies with various soil types found that picloram is usually confined to the upper 1 foot of the soil profile when application rates are low (less than 1 pound/acre), but that picloram can readily move to depths greater than 3 feet, even in relatively dry areas, when the application rate is high (3 to 9 pounds/acre) (NRCC 1974).

Table 3-1. Behavior of Herbicides in Soils

Active Ingredient/ Common Name	Behavior in Soil
2,4-D	Degradability in soil depends on microbial activity but is fast in organic and moist soils. Persistence is short, and mobility is relatively high.
Dicamba/Banvel	Moderately persistent, does not adsorb readily to soil particles, and is highly mobile. Mainly lost from soil by microbial decomposition.
Glyphosate/Roundup, Rodeo	Strongly adsorbed by soil. Adsorption is higher with organic soils and lowest in sandy soils. Decomposes rapidly by microorganisms.
Picloram/Tordon	Highly stable in plants, can be leached, relatively nonvolatile. Moderately to highly persistent in soil. Relatively mobile.

The persistence of picloram in soils is considered to be moderate to high because it may exist at phytotoxic levels for a year or more after normal application (Mitchell 1969, NRCC 1974). Picloram persistence in soil is related to both treatment rate and climate. The half-life of the compound has been reported to range from more than 4 years in arid regions to 1 month under highly favorable conditions of moisture, temperature, and organic content of the soil (NRCC 1974). On the other hand, two studies of picloram persistence in arid and semiarid soils suggest that application rates not exceeding 1 pound/acre/year significantly reduce the potential for accumulation in the soil; Scifres and others (1971) reported that studies on semiarid rangeland in northwest Texas found dissipation of 0.25 pound/acre of picloram from the soil profile within a year and usually within 90 days under warm dry conditions. Residues usually were restricted to the top 12 inches, at least for 60 days. Five ppb or less were detected below 12 inches 120 to 180 days after application. Vore and others (1982) reported that studies on different soil types in Wyoming showed the highest concentration of picloram was in the top 8 inches of soil. At applications of 1 pound/acre, concentrations ranged from 0.991 to 0.062 ppm after 117 days. As a comparison, the acceptable picloram tolerance level for forage grasses is 80 ppm (40 CFR 180.29).

Dicamba has a moderate (3 to 12 months) persistence in soil compared to other herbicides (Ashton 1982). Dicamba does not adsorb readily to soil particles and colloids (see Glossary) and thus has a high degree of mobility in most soils. The major route for loss of dicamba in soil appears to be microbial degradation rather than chemical degradation or photodecomposition.

Glyphosate is completely and rapidly degraded in soil by microbial degradation. In soil, glyphosate resists chemical degradation, is stable to sunlight, is relatively nonleachable, has a low tendency to runoff, is strongly adsorbed to soil particles, has a negligible volatility, and only slightly affects soil microflora. Because of its strong adsorption to soil particles, glyphosate is relatively immobile in most soil environments.

Use of the four chemical herbicides as proposed under alternatives 1 and 2 would not degrade soil productivity.

Alternatives 1, 2, and 3 would involve the burning of light noxious weed fuels that would not create the extremely high fire intensities that cause high losses of soil organic matter, the major source of nitrigen and sulphur in the soil, In addition to nitrogen and sulphur, nutrients, such as calcium, potassium, and phosphorous might be lost, resulting in short-term insignificant declines in soil productivity in the treated area.

Under Alternatives 1, 2, and 3, soil productivity could be slightly reduced by the destruction of some soil microorganisms, but impacts would be minor and shortlived because these alternatives would not involve the intense fires that reduce microorganisms most dramatically (Wells and others 1979).

Short-term, slight increases in erosion could occur until vegetation reoccupies the treated area.

The overall magnitude of burning impacts would be small because few acres are proposed for burning in the EIS area under any alternative (Table 1-2). Impacts on soils from burning weeds would be similar under Alternatives 1, 2 and 3. Alternative 4 would not involve burning.

Mechanical weed control practices such as tilling could result in slight short-term increases in erosion. The erosion rates would quickly decline as desirable vegetation reoccupies the treated area. No impacts from mechanical treatment would occur under Alternative 4.

Impacts on Water Resources

Alternative 1 (Proposed Action) would have varying impacts on water resources, including the introduction of herbicides into the water and increase in suspended sediments and dissolved solids. The degree of impact would depend on the size of the treated area, closeness to water, existing water quality, and type of treatment.

Impacts on Surface Water

The likelihood of a herbicide entering surface water depends upon the herbicide's persistence and mobility (see Glossary). Herbicides would most likely enter streams through drift (see Impacts on Air Quality). Some herbicides could also enter streams in surface runoff or through erosion of previously treated soils.

Where large streamflows occur, as in western Oregon and Washington, herbicides entering streams are heavily diluted so that little if any herbicide is detected.

In arid or semiarid areas, the normal streamflow is low or ephemeral. Where streamflow results from thunderstorms, surface runoff may flush herbicide residuals into streams in detectable levels. Amounts would depend on the length of time since spraying in which microbial action has been degrading the herbicide (see Impacts on Soils). The longer the interval, the less chance of residuals being present.

A study with 2,4-D applied for brush control on hill pastures in southern Oregon (Norris and others 1982) found that during 7 months following application, 4-5 grams of 2,4-D were discharged into streams, representing 0.014 percent of total amount applied. They concluded that most of the herbicide discharged into streams in this study were deposited in dry stream channels or from streambanks.

Ghassemi and others (1981) reviewed the persistence and fate of dicamba in aquatic systems. Because dicamba salts are highly water soluble and rapidly enter the soil, sufficient residues are unlikely to remain for transport via precipitation runoff into nearby waterbodies. Frank and Sirons (1980) found dicamba residues (0.7 parts per billion (ppb)) in only 1 of 949 stream samples after dicamba was applied to watershed soils.

Norris and Montgomery (1975) sampled a stream following treatment of 165.5 acres of a total 602.7-acre forest watershed in the Pacific Northwest sprayed aerially with dicamba at a rate of 1 pound/acre. Samples taken where the stream flowed out of the watershed contained dicamba residues within 2 hours after the start of spraying. These residues rose to a high of 37 ppb at 5.2 hours and then dropped to background levels (less than 1 ppb) 37.5 hours after the start of spraying. The authors attributed these residues to drift and to direct application of dicamba to water surfaces.

Because of its mobility, picloram may be carried by surface runoff to nontarget areas, including streams and ponds. Runoff, however, removes less than 3 percent of the total picloram applied to soil, and the concentration of picloram in runoff generally decreases with time as well as with the time between application and the first rainfall (Trichell and others 1968 in National Research Council of Canada 1974.) Other factors that decrease the concentration of picloram in runoff include decreases in the slope of the terrain, the use of slow-release granular formulations rather than liquids, and the distance over which the runoff flows.

Aerial application of a mixture of picloram at 2.5 pound active equivalent (ai) per acre and 2,4-D at 5 pound ai/acre resulted in detectable levels of picloram in runoff for 30.5 months (Johnsen 1980). The highest concentration of picloram detected was 320 ppb in the first storm after treatment. Of the total picloram applied, 1.1 percent eventually left the area in runoff.

The strong adsorption of glyphosate to soil particles greatly reduces its mobility through leaching and surface washout. Rueppel and others (1977) tested the mobility of glyphosate in three different soils by means of soil thin-layer plates spotted with radiolabelled glyphosate. These plates were washed twice with water, and the final distribution of radiolabelled glyphosate was determined by beta camera analysis after each washing. On all three soils tested, even after the second washing, glyphosate moved only a short distance, indicating that it is an immobile herbicide.

Comes and others (1976) investigated the leaching of residues from irrigation canal banks treated with glyphosate. They detected neither glyphosate nor its metabolite, aminomethyl phosphonic acid, in the first flow of water through canals that had been dry for 23 weeks after glyphosate had been sprayed on the ditch banks at a rate of 5 pounds/acre.

Since herbicide drift is far more variable during aerial spraying, the amount of herbicide drift that reaches the water is expected to be greater with aerial applications and proportionately less with vehicle and hand applications. Often no effort is made to exclude aerial spraying across ephemeral stream channels. In these instances rainfall may flush herbicide residuals downstream when little time has passed since spraying.

Vehicle application produces much less drift than aerial application, and hand application would produce little or no drift. Therefore, if herbicides originating from hand application reach the stream channels, it is usually through surface runoff.

Alternative 2 would result in little herbicide reaching a stream through drift. Surface runoff would move less residual spray because less acreage would be involved and spray entering buffer zones could be better controlled. Thus less residue would exist for movement into the streams.

Alternatives 3 and 4 would result in no herbicides from BLM actions reaching the stream channel. As discussed in Chapter 2, some streams have background detectable levels of herbicides resulting from ongoing herbicide applications by state and county agencies and by private landowners. Because BLM actions consist of a extremely small (less than 1 percent) part of the overall chemical use in the EIS area, Alternatives 1 and 2 are not expected to affect the detectable background herbicide levels in those streams. Therefore, water quality would not be adversely affected since background herbicide levels would essentially remain unaltered by the proposed herbicide use.

Normal BLM herbicide applications, using standard controls such as buffer strips, would not affect suspended sediments, total dissolved solids, or water temperature. Other actions under Alternatives 1, 2, and 3, however, such as grazing, burning, and tilling, could affect these conditions.

Physical restrictions on tilling (such as steep slopes) along buffer strips next to surface water would prevent significant impacts to water quality. In addition, few acres would be treated by tilling under Alternatives 1, 2, and 3 (Table 1-2).

Grazing with sheep or goats to control selected weeds would produce little effect on overall water quality although trampling within the stream channels could degrade water quality. Water quality indicators such as coliform numbers would increase, and in shallow streams might exceed drinking water standards. These exceedance periods, however, would extend no longer than 24 hours after livestock removal.

Burning to control noxious weeds generally destroys all vegetation. This removal of vegetation cover would increase the potential of surface runoff and might increase suspended sediment and total dissolved solids levels in the streams. Rice and others (1972) found that the amount of sediment reaching streams is generally proportional to the amount of bare soil in a watershed. The size of the impact from a treatment would depend on amount of exposed soil, severity of the burn, and distance to the nearest stream.

Tilling for weed control on a small scale with streamside buffer strips can benefit water quality. The tilling action breaks the ground surface and allows a greater infiltration rate. Infiltration rates vary with soil types and slopes. But terrain restrictions and the scattered nature of weeds do not allow the widespread use of this technique. Impacts from tilling would be greatest under Alternative 3 and least under Alternatives 1 and 2 (Table 1-2).

Impacts on Ground Water

Since picloram, dicamba, and 2,4-D are relatively mobile herbicides, the potential exists for detectable traces to enter the ground water. The relative immobility of glyphosate prevents it from moving down into the soil profile (see Impacts on Soils). The degradability of picloram, dicamba, and 2,4-D highly depends on microbes in the soil and water. The number of microbes decreases as herbicides percolate down through the profile. Ground water contains few if any microbes to carry on the degradation.

In western Oregon and Washington, the many soil microorganisms and high precipitation would combine to degrade or dilute herbicides to the level where little or no trace would occur in ground water. On the remaining BLM-administered land in the EIS area, little herbicide would enter the ground water for other reasons. Although moderate microbial levels slow the degradation process, low precipitation and deep ground water aquifers prevent herbicides from reaching ground water.

No herbicides applied on BLM-administered lands have been reported to reach the ground water. Although little information exists, nonfederally applied herbicides on private land have been reported to enter the ground water.

Streams and wetlands are areas where the ground water often occurs close to the surface. These areas are also high in microorganisms. With use of buffer strips spray would reach these areas only by drift. Because the amounts of herbicides are low and the microorganisms in these areas are high, no impacts on the ground water are expected.

The site-specific environmental analysis process conducted before herbicide applications will address sensitive areas, including areas where herbicides could be introduced into the ground water—ground water recharge areas. These areas may require mitigation (see Appendix I) or no treatment at all.

Impacts on Vegetation

Impacts on Terrestrial Vegetation

Terrestrial vegetation is the environmental component that would be most affected by the proposed weed control program. Treatment of noxious weeds could affect both target and nontarget vegetation.

Alternative 1 would have the greatest effect on noxious weeds (target vegetation) in the EIS area by providing the best possible total cooperative weed control effort. Alternative 2 would have somewhat less impact than Alternative 1. Alternatives 3 and 4 would allow the spread of noxious weeds to continue, and neither would provide cooperative efforts with other landowners within the EIS area. The effectiveness of each herbicide on individual weed species is presented in Appendix E.

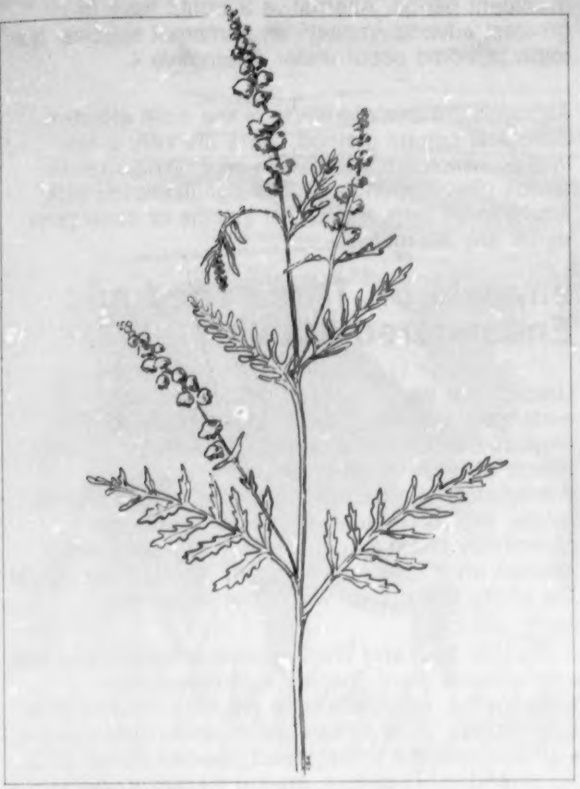
The proposed herbicides, excepting glyphosate, are selective, affecting broadleaf plants but not grasses. Glyphosate is a broad spectrum, nonselective herbicide that affects most perennial plants, annual and biennial grasses, sedges, and broadleaf plants. Under chemical techniques, some chemical residue may be left for varying periods, depending upon soil and climatic conditions.

Aerial application of herbicides, rather than ground application methods, presents the greater risks for effects on nontarget vegetation because of the broadcast application. (Note: Glyphosate would not be aerially applied.)

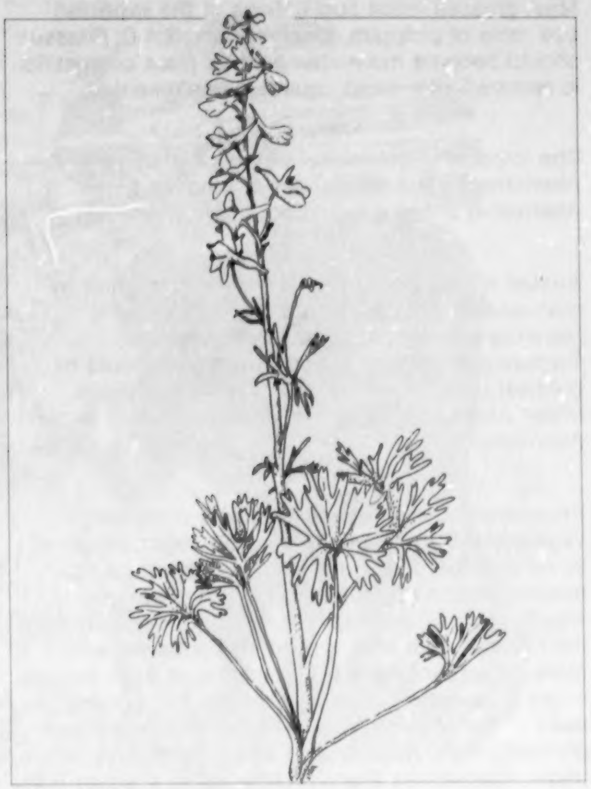
Because chemical drift could injure or kill nontarget vegetation, herbicides would not be applied when weather conditions would defeat their effectiveness or when controlling the treatment would be a problem (Appendix I).

Appendix G presents the susceptibility of terrestrial vegetation to herbicidal active ingredients. Glyphosate, the least selective of the herbicides that would be used under Alternatives 1 and 2, would result in the greatest loss of nontarget vegetation. For dicamba, picloram, and 2,4-D, broadleaf plants would be the main nontarget group affected. Plants such as rabbitbrush, greasewood, mountain mahogany, sagebrush, willows, aspen, and many forbs in or near treatment sites could be weakened or destroyed.

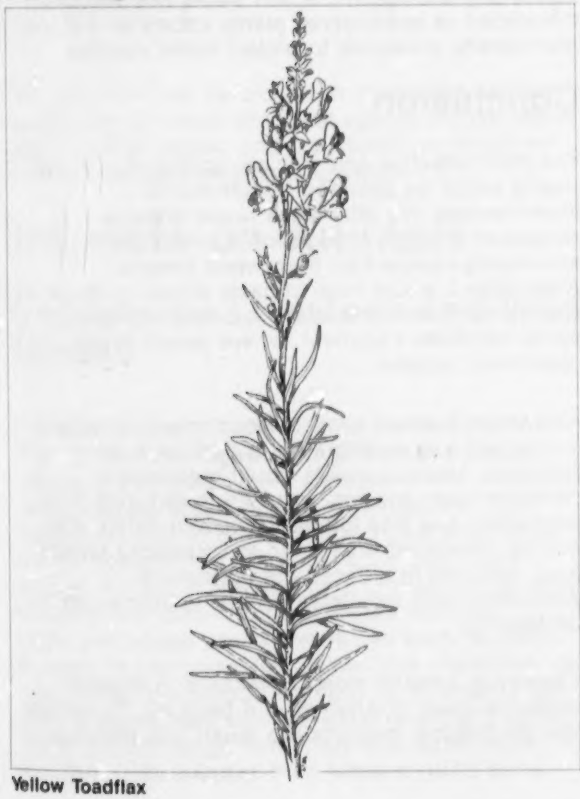
The extent of any nontarget vegetation loss would depend on closeness of desirable species to treated weeds, method and rate of herbicide application, formulation of the herbicide, and herbicide used. Because herbicide application rates would be reduced in riparian areas, injury to nontarget plants in these areas would be minimized.



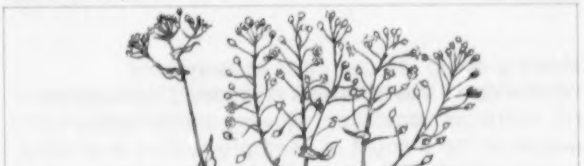
Common Ragweed



Desert Larkspur



Yellow Toadflax



Hoary Cress

Most grasses resist applications of the expected use rates of picloram, dicamba, and 2,4-D. Grasses should become more abundant as plant competition is reduced after weed control is implemented.

The impacts of chemicals would be greatest under Alternative 1 and less under Alternative 2. Alternative 3 and 4 would not apply chemicals.

Annual weeds would be the easiest to control by manual methods, but perennials and some biennials would tend to rapidly regenerate. Trampling impacts of manual treatment would be greatest under Alternative 3, progressively less under Alternatives 2 and 1, and nonexistent under Alternative 4.

Prescribed burning would suppress competing vegetation. Burning would promote regeneration of some grasses, forbs, and hardwoods but could destroy shrubs and other trees. Some noxious weeds such as leafy spurge regenerate rapidly from their root system after a burn and compete with more desirable species. The control of such species might thus require burning followed by applying low rates of herbicides. Impacts of burning would be greatest under Alternative 3 and progressively less under Alternatives 2 and 1. Alternative 4 would not permit burning.

Mowing would remove most aboveground vegetation in treated areas and would damage or kill nontarget vegetation. Mowing would mainly decrease the amount of seed production of noxious weeds. Mowing would also weaken root and rhizome systems of creeping perennial weeds when the treatment site is mowed every 21 days. Impacts of mowing would be greatest under Alternative 3 and progressively less under Alternatives 2 and 1. Alternative 4 would not involve mowing.

Tilling would injure both top growth and the upper 12 inches of the underground systems of all vegetation within the treatment area and would tend to break up the rhizomes of creeping perennials. Tilling would create a better seedbed for weeds promoting further spread. Impacts of tilling would be greatest under Alternative 3, and progressively less under Alternatives 2 and 1. Alternative 4 would not involve tilling.

Sheep and goats have been used to a small degree for leafy spurge control but only grazed on certain species of leafy spurge and removed only top growth. Since the greatest consumption of leafy spurge is about 50 percent, sheep and goats would also consume some nontarget species during the treatment period. Alternative 3 would have the greatest adverse impacts on nontarget species. No impacts would occur under Alternative 4.

Although the use of insects is the most effective biological control method, there are only a few insects which are effective in controlling specific weeds (See Appendix F). No significant impacts would result from the use of insects or pathogens under any alternative.

Impacts on Threatened and Endangered Plants

Unidentified populations of threatened and endangered plants could be susceptible to any impacts described for terrestrial vegetation. Direct effects of injury or death to plants could immediately eliminate a species in a portion of its range. The more subtle effects of vegetation community changes could eventually eliminate a species on a specific site locally through the loss of the ability to compete with other vegetation.

If the U.S. Fish and Wildlife Service determines that any vascular plant species is threatened or endangered, any action that would contribute to its extinction or to its threatened or endangered status would violate the Endangered Species Act of 1973, as amended. Therefore, environmental analysis before any site-specific action would document any threatened or endangered plants known on the site and identify measures to protect these species.

Conclusion

The most effective and efficient control of noxious weeds would be provided by Alternative 1. Implementing this alternative would improve rangeland ecological condition by reducing or eliminating competition from weed species. Alternative 2 would have impacts similar to those of Alternative 1 except in areas accessible only to aerial herbicide treatment, where weeds would continue to spread.

Alternative 4 would allow noxious weeds to spread unchecked and contribute to a decline in ecological condition. Noxious weeds would outcompete desirable plant species, resulting in reduced grass production and less forage for both livestock and wildlife. Weeds would spread to uninfested private land, resulting in a decline in agricultural productivity and increased economic burden on landowners.

Alternative 3 would most likely result in impacts similar to those of Alternative 4 because (1) manual and mechanical methods are much less effective

and efficient than herbicides in controlling noxious weeds and (2) most biological agents are are still in experimental stages, and their ability to effectively control noxious weeds is in question.

Impacts on Animals

Impacts on Livestock and Wild Horses

Impacts to livestock and wild horses could occur directly from the ingestion of poisonous noxious weeds and indirectly from changes in the current forage supply and exposure to herbicides. Toxic reactions occur to livestock that ingest poisonous weeds found in the EIS area (Table 3-2). Leafy spurge, for example, contains an irritant to the eyes of cattle and horses. It also causes diarrhea in cattle and sheep which sometimes leads to death. A study of knapweed has shown that infestation can drop forage production from 891 to 54 pounds per acre in a relatively short period (French and Lacey 1983). Effects range from blisters to death within 30 minutes. Data adapted from Nielson (1978) show the annual estimates (not including swine, goats, or horses) as follows:

Cattle - 1 percent mortality of adult animals
Cattle - 1 percent reduction in calf crop
Sheep - 3.5 percent mortality of adult animals
Sheep - 1 percent reduction in lamb crop

These estimates are based on the assumption that some degree of poisonous weed control is accomplished.

Chemical treatments are generally applied in a form or at such low rates that they do not affect livestock. Most major treatments under the proposed alternatives would be applied when livestock are not in the treated pasture, but spot treatments would be applied at any time, regardless of the presence of livestock. Animals consuming forage treated with certain herbicides (picloram, 2,4-D, and dicamba) cannot be slaughtered for food within the period of time specified on the herbicide label. Dairy animals should not be grazed on areas treated with certain herbicides (picloram, 2,4-D, and dicamba) for the length of time specified on the label.

Table 3-2. Impacts of Toxic Weeds on Foraging Livestock

Common Name	Scientific Name	Poison Symptoms	Causative Agent	Animals Affected
Cocklebur	*Xanthium straumarium*	Vomiting, weakness, ataxia, spasms and death within 24 hours.	glycoside	swine, cattle, sheep, goats
Common groundsel	*Senecio vulgaris*	Acute and chronic liver damage, colic, and death.	alkaloids	all
Death camas	*Zigadenus paniculatus*	Weakness, prostration, convulsions, coma and death. High mortality.	alkaloid	cattle, sheep, goats
Halogeton	*Halogeton glomeratus*	Slobbering, weakness, prostration, coma, death.	oxalates	sheep, goats and cattle
Indian hemp	*Apocynum cannabinum*	Dilation of pupils, sore mouth, sweating, death.	glucosida	horses, cattle, sheep, goats
Jimsonweed	*Datura stramonium*	Paralysis, delirium respiratory paralysis and death.	alkaloid (scopolamine)	all
Larkspur	*Delphinium spp.*	Constipation, bloat, death results from respiratory and cardiac failure.	alkaloid (delphinine)	cattle
Leafy spurge	*Euphorbia esula*	Diarrhea, blisters in digestive tract, collapse and death.	euphorbon	all, but sheep graze on some biotypes without harming them.
Locoweed	*Astragalus spp.*	Diarrhea, blindness, labored breathing, prostration, death.		all
Nightshade	*Solanum spp.*	Diarrhea, incoordination paralysis, convulsions, death.	glycoside and alkaloid (solanin)	swine, sheep, goats
Poison hemlock	*Conium maculatum*	Paralysis of skeletal muscle nerves, death due to respiratory failure, birth defects.	alkaloid (y-coniceine)	all
Sneezeweed	*Helenium spp.*	Diarrhea, vomiting, loss of muscle control, death.	glycoside (dugaldin)	all
St. Johnswort	*Hypericum perforatum*	Photosensitization-blisters and scabs about eyes, mouth, ears, nose, and feet.	helianthrone (hypericin)	cattle, hogs, sheep, goats
Tansy ragwort	*Senecio jacobaea*	Liver lesions, staggering weakness, and death.	alkaloids	all
Water hemlock	*Cituta douglasii*	Irritant action on nerve and muscle cells - spasms, death after 30 minutes.	resinoid (cicutoxin)	all
Yellow starthistle	*Centaurea solstitialis*	Animals are unable to eat and die of starvation or thirst (chewing disease).		horses
Lupine	*Lupinus spp.*	Spasms, cerebral excitement and death within 48 hours, birth defects.	alkaloids (lupinine, lupanine)	sheep, goats, horses, cattle
Russian knapweed	*Centaurea repens*	Nervous disorders.		horses
Coast fiddleneck	*Amsinckia intemedia*	Hepatic cirrhosis, dermatitis.	pyrralizidine alkaloids	all
Western false-hellebore	*Veratrum califomicum*	Cyclopia, limb deformities (monkey faced lamb, crooked calf).	steroidal alkaloids	ruminants
Snakeroot	*Eupatorium rugosum*	Trembling, labored respiration, inability to stand and "milk sickness".	alcohol (tremetol)	ruminants

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[1] Symptoms may vary according to dose, duration, and plant growth stage at ingestion. Sources: Hulbert and Oehme 1961; Muenscher 1961; Keeler and Tu 1983; Hawkes and others 1985.

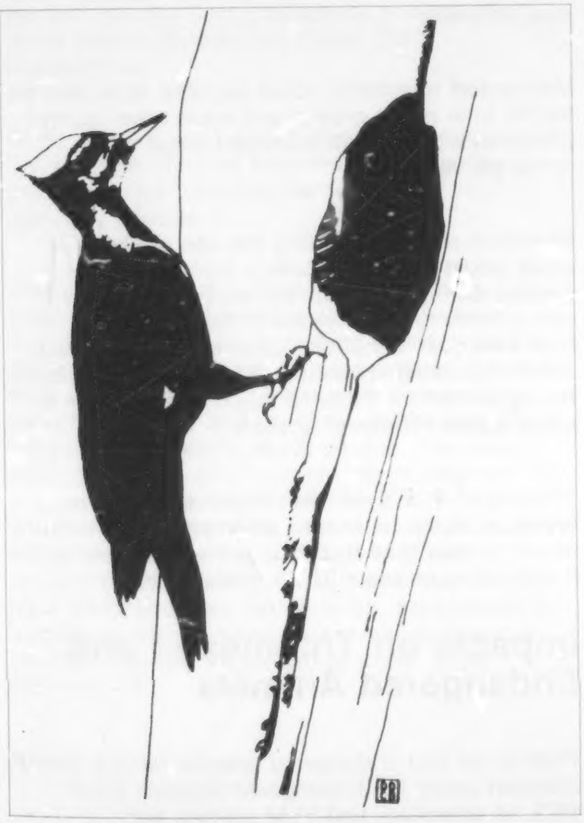
Burning of weeds would temporarily reduce forage or livestock and in some cases could result in a lenser weed regrowth than existed before burning. Combinations of burning, regrowth, and applying ower rates of herbicides could effectively control noxious weeds and allow forage grasses to egenerate more rapidly. Mechanical treatments may also reduce livestock forage during the reatment period.

Where sheep and goats are used for biological control, their performance may decline because of their having to eat less desirable vegetation when confined in particular areas. Other biological means (insects, microorganisms) would require that ivestock not be allowed to use a pasture during relatively short periods. This would depend upon the biological agent used and guidelines for the establishment of the agent.

Alternatives 1, 2, and 3 provides more desirable forage for livestock and wild horses. The number of plants toxic to livestock or wild horses, such as leafy spurge, tansy ragwort and larkspur would decline. Alternative 4 would result in a decline in desirable forage. Noxious weeds toxic to livestock and horses would spread, leading to increased animal losses. Alternative 3 would probably result in impacts similar to Alternative 4's since manual, mechanical and biological methods are less effective and efficient in controlling noxious weeds than are herbicides.

Impacts on Wildlife and Fish

Most impacts on birds and mammals would result from the destruction of nontarget vegetation. Depending on the rate of application and formulation of the herbicides, aerial application would cause varying degrees of injury or losses of nontarget vegetation, thus decreasing vegetation for wildlife. These losses would be insignificant in the short term over the entire area because of the small areas treated (usually less than 100 acres in size and most often less than 10 acres) as compared to the land base that is spread over five states. The effects of weed control would be significantly beneficial over the long term in that



Pileated woodpecker

Snowshoe hare

weeds would be prevented from further degrading the habitat. (National Academy of Sciences 1968, and Morris and Bedunah, 1984.)

The risks to the health of wildlife and fish from exposure to the herbicides 2,4-D and glyphosate are discussed at length in the Final Environmental Impact Statement on the Eradication of Cannabis on Federal Lands in the Continental United States at pages 4-20 to 4-41 and Appendix C (U.S. Department of Justice, Drug Enforcement Administration, July, 1985). The expected exposure to wildlife and fish to 2,4-D and glyphosate under the proposed action are analagous to those discussed in the FEIS on the Eradication of Cannabis on Federal lands. Hence, the Drug Enforcement Administration's FEIS evaluation of the impacts on wildlife and fish from exposure to 2,4-D and glyphosate, which includes both a hazard assessment and a Worst Case Analysis, is incorporated by reference. Specifically, the following two summaries of these impacts in that EIS are noted:

- Under routine circumstances, no animals are likely to receive highly toxic or fatal doses of any of the proposed herbicides. However, under unusual circumstances, where animals are directly sprayed and feed exclusively on vegetation containing herbicide residues, individual animals could receive acute toxic herbicide doses. It is also possible, although very unlikely, that under extreme case conditions, some individuals from some species could be severely affected by 2,4-D. However, even under those conditions, no species are likely to receive acute toxic doses of glyphosate. Therefore, no wildlife populations are likely to be adversely affected.

- Under routine case operations, no impact to slight impacts could occur to fisheries as a result of proposed herbicide use. In the extreme case, 2,4-D could cause individual aquatic species to be exposed to lethal concentrations for a short period of time and localized fish kill could occur.

A more thorough summary of impacts on wildlife and fish from exposure to 2,4-D and glyphosate from the incorporated FEIS may be found in Appendix K, Wildlife Health Effects.

Although trout have been found sensitive to the herbicide picloram, a no observed effect level of 0.29 ppm has been determined for trout fry (Woodward 1979). Incorporation of design features (Appendix I) under Alternatives 1 and 2 would eliminate any adverse impacts from applying picloram. Likewise, use of dicamba, glyphosate, and 2,4-D as proposed should cause no adverse effects.

Prescribed burning could destroy animals, including birds, unable to flee treated areas or escape into burrows. Spring burns (March through June) would destroy nests with eggs and young hidden in vegetation.

Prescribed burning could also temporarily destroy wildlife habitat for some species until regrowth of wildlife habitat occurs. Effects on ground cover would vary with burn intensity. Lower intensity burns on wet sites would remove less ground cover than higher intensity burns on dry sites. Loss of small ground cover and charring of larger branches and logs in small areas of cottonwood stands (with trees exceeding 3 inches in diameter) would harm some birds (woodpeckers, chickadees) and small mammals (weasels, rabbits, deer mice) that use these riparian area residues for food or shelter. Charring of large branches and logs would also harm insects, an important link in the food chain. These impacts from burning are usually short term, whereas in the long term wildlife could benefit from increased forage production in important areas. Burning of downed woody material could cause a long-term reduction of this important habitat in riparian areas.

Mechanical treatments could displace large animals for the time of the project and could have indirect effects associated with damaged target and nontarget vegetation.

Biological controls involving the use of sheep or goats would probably displace some big-game species during the treatment period and might cause some temporary loss of feed for the treatment year. Other biological methods (insects, microorganisms) should not adversely affect wildlife. Biological control methods would not significantly affect aquatic plants or animals.

The risk of wildlife and fish health effects from exposure to the herbicides dicamba and picloram would be less than that arising from the use of 2,4-D and glyphosate (USDI, FWS, 1980).

Impacts on Threatened and Endangered Animals

Threatened and endangered species receive special attention under the Endangered Species Act of 1973, as amended, and BLM policies and guidelines. Noxious weed control activities will avoid known nest and roost sites and critical habitat of listed species or will take special precautions to ensure the well-being of these species (see Chapter 1, Weed Management Treatments and Design Features). No adverse impacts are expected to occur to these existing sites.

Conclusion

Implementing the proposed weed control program would cause a temporary loss of productivity of treated sites grazed by livestock and serving as an ecological niche for wildlife. Controlling exotic noxious plants and encouraging native plant growth would ensure future productivity and use of the land for livestock grazing and wildlife.

In the short term, the loss of target and nontarget vegetation would cause temporary loss of food, cover, and other habitat requirements for wildlife and livestock in the treatment areas. Over the long term, increased vegetation productivity of grasses and forbs would increase the productivity of the land for livestock and wildlife. Failure to control or limit the spread of such noxious weeds as knapweed and leafy spurge, would reduce by 60 percent the long-term productivity of palatable native plants. (Bucher and Baker. 1984, unpublished).

Under alternatives 1 and 2, habitat diversity would improve over the long term thereby benefiting all animal species. Likewise, fish would not be adversely affected.

Under Alternative 4 a dramatic loss in forage production in weed-infested areas would harm foraging animals. The immediate impact would be displacement, which would place greater stress on other forage areas and force more competition between livestock and big game. In the long term, big game populations would decline. The loss of plant diversity in an ecological community can lead to decreased vigor in the animals occupying the community, making them more susceptible to other stress factors. The loss of forage may cause animals to more readily consume weeds that may harm them and even cause death. An example is larkspur, a noxious weed that is fatal to livestock. Similar but lesser impact would occur under Alternative 3.

Impacts on Cultural Resources

Mechanical and burning control measures could potentially disturb or destroy unidentified cultural resources on or near the ground surface. The potential for damage would vary with the amount of ground disturbance and burning under each alternative. Tilling weeds could damage artifacts and disrupt relative positions of cultural materials. Mixing organic matter in archeological sites could contaminate carbon 14 dating samples, making them unreliable for scientific analysis. Uncovering sites could increase the possibility of illegal artifact collecting. Burning for weed control could destroy combustible cultural materials and damage stone and ceramic artifacts.

Cultural resource surveys, however, would precede management actions that could damage cultural resources (BLM Manual 8100, Cultural Resource Management). Under all alternatives, sites found during these surveys would be protected in accordance with the National Historic Preservation Act of 1966 (P.L. 89-665) and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR 800).

Impacts on Visual Resources and Recreation

Treatments such as tilling, burning, and applying herbicides cause visual impacts mainly by creating color contrasts between treated areas and surrounding vegetation. Tilling disrupts the land surface and exposes bare soils to view. In addition to causing color contrasts, applying herbicides reduces vegetation variety and can prevent the occurrence of seasonal changes (spring flower, fall color) within treated areas. Burning creates contrasting blackened areas and releases smoke, which temporarily impairs visibility. These short-term impacts, however, would end with the reestablishment of other plants on the sites.

Most weed control treatments would be applied in visual resource management (VRM) Class IV areas (see Glossary). Because these public lands are generally of low to moderate scenic quality, are low sensitivity areas seldom seen by most people, and are intermingled lands managed mainly for livestock grazing, visual and recreation impacts in VRM Class IV would be low under all alternatives.

Impacts of herbicide residue on the health of public land visitors are discussed in Impacts on Human Health.

Designated BLM recreation sites that are treated with herbicides will have signs posted stating the chemical used, date of application, and a contact number for more information. Signs will remain in place for at least 2 weeks after spraying.

Alternative 4 (No Action) would increase the exposure of visitors to recreation areas infested with noxious weeds, including: stickers of thistles; ragweed pollen; the irritant latex of leafy spurge; the poisons of water hemlock, nightshades, and lupines; and the clinging seed pods of the buffalo burr. Visitor use would decline. These impacts would also apply under Alternative 3 in areas where nonchemical treatment would fail to produce desired effects. Alternatives 1 and 2 would decrease visitor exposure to detrimental effects of noxious weeds.

Roosevelt elk

Impacts on Wilderness and Special Areas

The suppression of noxious weeds in wilderness and wilderness study areas (WSAs) under Alternatives 1 and 2 would maintain or increase naturalness by controlling exotic weeds that would otherwise compete with native plants. Alternative 3 would have the same impact as Alternatives 1 and 2 when nonchemical measures sufficiently control noxious weeds. Alternative 3, however, would allow noxious weeds to continue to spread as under Alternative 4 and compete with other plants when nonchemical treatment is not effective, causing a decline in naturalness.

As in wilderness areas or WSAs, all weed control treatments applied on or near the following designated or proposed areas would incorporate features designed to avoid or mitigate impacts on important resources: research natural areas; outstanding natural areas; national wild, scenic, or recreation rivers; national scenic or recreation trails; state recreation trails; and areas of critical environmental concern. Impacts would be most likely under Alternative 1, which proposes aerial spraying, and nonexistent under Alternatives 3 and 4. Site-specific impacts to special areas will be addressed further in state or district environmental analysis that precedes weed management action.

Impact on Economic Conditions

This analysis considers the effects of the alternatives on livestock grazing and the effects of weed control activities and the spread of noxious weeds on the regional economy. Economic impacts are presented for each alternative on the basis of changes in forage availability, change in weed control activities, and potential spread of noxious weeds. Table 3-3 shows increases in forage, weed control costs, and acres treated and not treated under each alternative.

A potential economic impact of noxious weeds on BLM lands is the spread to adjacent private lands. No monetary value of this affect has be projected due to the difficulty of making meaningful estimates. However, the alternatives have been ranked relative to each other based on acres of noxious weeds remaining on BLM lands as a source of potential spread to other lands.

ler Alternative 1, local economic activity ployment and personal income) would slightly ease from increased AUMs, increased livestock duction, and reduced livestock deaths from sonous plants. The increase in AUMs is a rimum figure based on the assumption that no stock now graze the infested area. In addition, l expenditures on equipment and materials for trolling weeds would generate spending in the l economy. The impacts to adjacent land ers would be least under this alternative ause less land area would remain infested with ious weeds.

ler Alternative 2, the loss of AUMs from the ead of noxious weeds would reduce the gain in Ms as a result of controlling some of the weeds. estock could die on the untreated acres, and enditures on weed control would generate nomic activity in the local economy. The local nomy would benefit slightly under this rnative, but the gains would be smaller than ler Alternative 1. Economic effects of spread to acent land owners would be greater than under rnative 1, but less than under Alternative 3 and

ble 3-3. Acres Treated, Forage Changes, d Acres Remaining Untreated

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
s of treatment	44,014	40,974	28,960	0
t AUMs of forage ained frim treated ea[1]	4,700	4,200	2,900	0
eated acres [2]	0	3,040	15,054	44,014
mated acres of noxious weeds in 0 yrs. 13% rate of oread	0	10,300	51,100	149,400
mated loss of AUMs from untreated cres in 10 yrs [2] [3]	0	-900	-3,400	-8,700
al 1st year cost of ontrol (1984 dollars)	$1,350,000	$1,350,000	$1,350,000	0

ased on the statewide average acres/AUM for each of the five ates: Idaho, 11 acres/AUM; Montana, 5 acres/AUM; Oregon, 11 res/AUM; Washington, 8 acres/AUM; Wyoming, 10 acres/AUM. Also sed on the assumption that no livestock graze noxious weed-ested land.

ased on Alternative 1 as total targeted acreage for treatment.

ased on 13 percent annual rate of spread and increasing reduction carrying capacity from 25 percent in first year to 100 percent in the through 10th years.

Alternative 3 would result in both a loss of AUMs from the untreated acres and a gain in AUMs from the treated acres. Livestock could die on the untreated acres, and expenditures on weed control would generate economic activity in the local economy. Under this alternative, the local economy would either be unaffected or slightly changed. Economic effects to private land owners would be greater than under Alternative 1 and 2, but less than under Alternative 4.

Under Alternative 4, no short-term loss in AUMs would occur, but future losses could result from the annual unchecked spread of noxious weeds. Applying a figure of $4.33 ($19.5 million divided by 4.5 million acres, Penhallegon, 1983) per acre, one could calculate that in 10 years the economic loss from untreated BLM lands in the EIS area would amount to $647,000. Untreated noxious weeds on BLM land would continue to serve as a seed source, and infest adjacent nonpublic land, contributing to continuation of and probable increase in the economic losses referred in the studies cited in Chapter 2, Economic Conditions. In addition, livestock deaths from poisonous plants would continue. (See Impacts on Livestock and Wild Horses for a discussion of livestock production losses under Alternative 4.) Economic losses to adjacent landowners would be greatest under this alternative.

Total cost per acre of controlling weeds under Alternatives 1, 2, and 3 are as follows: Alternative 1--$36, Alternative 2--$39, and Alternative 3--$55.

Impacts on the Social Environment

BLM's noxious weed control program would directly and indirectly affect social conditions and attitudes. Direct impacts would occur when senses of personal well-being or economic security are affected by BLM's decisions on the use or restriction of vegetation management practices. Indirect effects would occur as a result of economic outcomes of BLM policies and in response to gains or losses of recreational opportunities or access to subsistence activities. Examples of social effects deriving from economic impacts include people's reactions to changes in the availability of different kinds of jobs and their dependence on certain jobs. Whether direct or indirect, all of these impacts could affect lifestyles.

The economic impacts of the alternatives on the local economy are discussed in the preceding section of Chapter 3. The economic effect on individuals who gain or lose jobs would be essentially the same wherever they live. Social effects, however, would depend on whether the jobs gained or lost are concentrated or dispersed or in small or large communities. For example, the gain or loss of 100 jobs scattered around the larger cities in the EIS area would not have significant social effects. In contrast, the concentration of those 100 jobs in two small towns with a combined workforce of 500 would significantly affect social conditions in these towns.

The social impacts of employment changes can be estimated, but data do not exist to allow the projection of where those impacts would occur.

Alternatives 1 and 2 would probably have beneficial social impacts on communities in the EIS area, and none of the alternatives is expected to have significant social impacts resulting from employment changes associated with increases or decreases in forage. The affected jobs would probably be scattered across the entire region.

Because of the controversy surrounding herbicide use, Alternatives 1 and 2 would have social effects specifically related to this issue. Alternatives 1 and 2 propose the use of herbicides and would be perceived as involving some harm by those opposed to herbicides. These impacts would be greatest under Alternative 1 and somewhat less under Alternative 2. Alternatives 3 and 4 would be perceived as having the most adverse impacts by those who support the use of herbicides in weed management.

Many people believe that herbicides are safe to use and that risks associated with herbicide use are acceptable to themselves as individuals and to society. These people could perceive limitations on the use of herbicides as threatening to their jobs and lifestyles, and in some large sense to society as a whole. The threat they perceive to society is usually articulated as job losses forcing some to go on welfare.

On the other side of the herbicide controversy are others, particularly residents near areas to be sprayed, who perceive helicopter spraying as a threat because they associate helicopters with military activities or because they feel helpless to avoid exposure or to stop the spraying in case of unexpected drift or accidental overflight of nontarget areas. These people would be adversely affected by Alternative 1, which proposes helicopter spraying of herbicides.

Another category of social effects related to the use of herbicides includes fears and anxieties about human health and personal safety. These concerns would be related to the amount of herbicides used and would thus be greatest under Alternative 1 and less under Alternative 2. For those concerned about this issue, Alternatives 3 and 4 would have beneficial impacts.

Impacts on Human Health

Under Alternatives 1, 2 and 3, the use of hand tools (manual), tilling (mechanical) and grazing, insects, and pathogens (biological) methods of weed control would not adversely affect human health. The other methods that would be used under these alternatives are discussed below.

Mechanical Treatments

Smoke from burning is not expected to significantly affect human health under any alternative. Levels of suspended particulates (a suspected factor in some health problems) are expected to be well below the 150 micrograms per cubic meter (ug/m^3) public welfare standard and the 260 ug/m^3 public health standard published by EPA.

Workers on burn areas would be exposed to potential injury from the manual treatments they would apply and the conditions under which they would work (see discussion under Manual and Mechanical Treatments below). Workers who manually ignite burn areas would be exposed to burning materials, which could cause physical injuries.

The probability of workers on burn areas being injured would be about the same under Alternatives 1 and 2, but injuries associated with burning would increase under Alternative 3. Alternative 4 would not permit burning.

Public safety would not be affected by any method of igniting burn areas. Most burning would occur where the public either would not be present or would be highly visible to those doing the burning. Further, those on or near a burning area would be well aware of impending activities because several hours of active preparation are required before ignition begins. Safety measures normally taken to protect firefighters participating in prescribed burning would also protect the public.

Operators of machinery (tractor-mounted mowers) could be injured by losing control of equipment on steep terrain or by coming into contact with flying debris and brush. Such hazards would be most likely under Alternative 3 and least likely under Alternative 1.

Manual Treatments

Under Alternative 1, and particularly Alternatives 2 and 3, some hand pulling would be needed. Hand pulling exposes workers to the hazards of physical contact with irritant weeds that cause blisters, inflammation, and dermatitis (leafy spurge, *Euphorbia esula*; common tansy, *Tanacetum vulgare*). Sensitive individuals can react severely to the pollen of ragweed *(Ambrosia)* species, and the close contact of hand pulling could cause major discomfort or health risk. A severe hazard of hand pulling is the high potential for poisonous snake bite. The remoteness of many treatment areas and the time needed to gain medical attention would complicate some cases of snake bite poisoning.

Chemical Treatments

Herbicides are intended to be toxic to plants. They are designed to interfere with vital plant processes that do not occur in animals: seed germination, hormone (auxin)-mediated growth and development, and photosynthesis. Basic biological and physiological differences between plants and animals partly account for the relatively low toxicity of herbicides to animals.

The main impacts on human health from chemical treatments depend upon the toxicity of the chemical and the level of human exposure. All chemical effects on biological systems follow a dose-response relationship: as dose increases so does effect, and vice versa. The chemicals of concern in this EIS have not been found to cause significant mutagenic or carcinogenic effects. For such chemicals, a no observed effect level (NOEL) dose can be established as the highest dose that causes no toxicologic change in exposed animals. The term threshold is also used to identify this dose range.

Chemical exposure may be brief (acute) or prolonged (chronic). The terms acute and chronic may be used to describe duration of effect as well as duration of exposure. The kind of response (acute or chronic) observed in organisms depends on the route of intake (oral, dermal, inhalation) and frequency of exposure, coupled with the specific mechanisms of toxicity. A chemical of high toxicity may represent no or limited hazard if exposure and dose are low, just as a chemical of limited toxicity may be hazardous if exposure is high.

Extensive studies of the absorption, distribution, metabolism, and excretion of herbicides in animals (DOE, BPA 1983) have shown that the herbicides of concern in this document and their metabolites are rapidly eliminated from most animals and do not substantially accumulate in animal tissues. These traits further reduce the possibility that exposure will result in harmful consequences.

An often used term is the acute oral LD_{50}, which is the dose of toxicant, expressed in milligrams of toxicant per kilogram of animal body weight, required to kill 50 percent of the animals in a test population when given orally. The oral LD_{50} value is a useful general guide for comparing the acute toxicity of chemicals. But because the acute toxicity of most herbicides is low, LD_{50} is not used as a basis for comparing hazards. Acute dermal (skin contact) toxicity levels are almost always less than acute oral levels. Although dermal exposures are most common, they are of limited use except when an unusual response is found in the laboratory or for judging topical irritant potency. Table 3-4 shows the relative oral LD_{50} toxicity levels of herbicides proposed for use under the alternatives in this EIS.

Of concern is the probability that use of a chemical will result in an irreversible disease such as reproductive or genetic effects. Reproductive effects include infertility, miscarriage, general fetal toxicity, and birth defects (teratogenesis). Genetic effects are those that alter cellular DNA (see Glossary) and could result in cancer or mutations. Almost all chemicals will produce reproductive effects in the laboratory at some dose, although some cause maternal death before any detectable impact on the fetus. Of the great number of chemicals in commerce that have been tested, few have been shown to cause cancer, and few have shown significant mutagenic activity in the variety of tests used to screen for genetic activity.

Possible reproductive effects may involve (1) toxicity to the fetus, ranging from completely reparable effects to lethal damage or (2) true teratogenicity in which the development of the fetus goes awry, resulting in malformation. Such effects may be caused either by direct impact of the chemical during the period of organogenesis (see Glossary) or by genetic damage in one or both parents before conception. Genetic damage is considered a mutational effect. A characteristic of chemical teratogenesis is that a threshold of effect exists, just as is the case for all nongenetic insults. Oral chronic or subchronic effects are often expressed

Table 3-4. Relative Toxicity Levels of Herbicides

	Dicamba	Glyphosate	Picloram	2,4-D
Trade name	Banvel	Roundup; Rodeo	Tordon	
LD_{50} (mg/kg)[1]	1,040-2,900	4,320-4,900	2,000-8,200	374-1,960
Commonly Used[2] terms	Slightly toxic	Slightly toxic	Slightly toxic	Moderately to slightly toxic
Activity in soil	Poorly absorbed by soil; short persistence	Inactivated upon contact with the soil.	Sorption by organic matter and clays; may leach in sandy soils; persistent.	Leached in sandy soil; breakdown depends on microbial activity.
Chronic NOEL[3] (mg/kg/day)	5	30	20	20
Tolerances for residues in or on foodstuffs (parts per billion)	50	100-6,000	50-500	100-500

[1] Most LD_{50} values are expressed as a range, reflecting the lack of preciseness of experimental data and differences in experimental condition, the type of carrier in which the toxicant is dissolved, or the species of test animal used.

[2] Moderately toxic is 50-500 mg/kg; slightly toxic is 500-5,000 mg/kg; practically nontoxic is 5,000-15,000 mg/kg; relatively harmless is more than 15,000 mg/kg in a single oral dose to rats.

[3] The highest dosage level at which no reproductive effects have been observed in test animals, including decreased fertility, reduced litter size, reduced offspring size or poor viability (reproductive) and fetus malformations during development; not associated with genetic change (teratogenic).

Sources: Oregon State University, Extension Service 1982; DOE, BPA 1982, Table 7-7; Walstad and Dost 1984

as the no observed effect level (NOEL) in mg/kg/day. NOEL is the highest daily dose that causes no effect in the animal test population. Table 3-4 shows the relative NOEL values for the herbicides proposed for use under the alternatives in this EIS.

The four chemicals proposed for use to control noxious weeds are picloram, 2,4-D, glyphosate, and dicamba. The next four paragraphs summarize toxicity for each.

Picloram is considered moderately to highly persistent in soils under conditions of normal application. No impairment of reproductive capacity has been associated with chemical treatment. Teratonic effects have not been shown. Picloram has produced no detectable mutations in *in vitro* tests. Research has not shown picloram to be carcinogenic, but an open and valid scientific question exists concerning the meaning of nodules or benign tumors produced in the livers of female rats. Because of apparent scientific discord surrounding the carcinogenic potential of picloram, an assessment of such risks is presented in Appendix N of this EIS.

2,4-D is considered to be a relatively nonpersistent herbicide, which generally remains within the top foot of the soil profile. It has shown weak mutagenic activity in some of the many assays to which it has been subjected. It can cause fetal toxicity when the dose is raised high enough. It is a teratogen in some animal species but not in others. Like many chemicals, 2,4-D can cause subtle reproductive effects at high dosages. It does not present a mutational hazard at amounts found either in the workplace or in the general environment. Long-term studies in animals have found 2,4-D to be a "suspect carcinogen," but no conclusive data show the carcinogenicity of this compound. Because of the weak mutagenic effect, the absence of data to support a conclusion that 2,4-D is not valid carcinogenic, and the controversy surrounding the use of this chemical, Appendix N of this EIS presents an assessment of 2,4-D's carcinogenic potential.

Glyphosate has short persistence in soil and water and has low toxicity to mammals. No treatment-related effects on reproductive performance have been observed. No evidence of birth defects has been observed. There is no evidence that glyphosate is a mutagen. A recent chronic mouse feeding study conducted with extremely high doses of glyphosate showed a treatment-related increase in the incidence of renal tumors in male mice. These tumor results were not statistically significant when compared to the concurrent control. Because of this limited amount of qualitative evidence indicating a weak oncogenic effect, Appendix N of this EIS presents an assessment of glyphosate's carcinogenic potential.

Dicamba is considered a highly mobile herbicide. It mainly degrades through microbial action and has relatively short persistence. Reproductive and teratogenic effects have not been observed in several rat studies, but teratogenic effects have been observed in rabbits at high doses. Application of dicamba in programs covered by this EIS should be performed only by males. Dicamba has been tested for mutagenicity with negative results. Chronic feeding studies with animals have found no carcinogenicity.

Of the chemicals proposed for use, none are established as having carcinogenic effects. Existing negative assays on some chemicals have been questioned and are being redone because of inadequate procedures or analysis. Picloram and 2,4-D have shown evidence of carcinogenicity in tests that were improperly carried out and reported. A single glyphosate feeding study showed limited evidence of oncogenic effects in mice. These results are thus of questionable value in judging hazard. Retesting is now in progress.

The dose-response relationship applies to carcinogens and to other chemicals. For risk assessment and regulation, the probability of genetic effect from such chemicals can be estimated under the assumption of a linear dose response. When the maximum estimated exposure is so low that expected incidence is, for example, one case in a million lifetimes or less, the exposure is generally considered to represent an effect of virtually zero.

The issue of herbicide carcinogenicity has been raised in the case of 2,4-D and was reviewed by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Scientific Advisory Panel for the U.S. Environmental Protection Agency (EPA) in June 1980. Their report (EPA 1980) addressing work by Hansen and others (1971) and Rueber (1979) stated:

"The FIFRA Scientific Advisory Panel has reviewed the chronic toxicity study on 2,4-D carried out in rats and dogs by Hansen and others, which was published in Toxicology and Applied Pharmacology (TAP). In addition to peer review of this study by the editor and editorial board of TAP, the study has also been reviewed by the National Cancer Institute (NCI) and by Dr. M. Rueber. The NCI review agreed with the conclusion of the authors of this paper that a carcinogenic effect was not demonstrated for 2,4-D whereas Dr. Rueber's conclusion was that 2,4-D is carcinogenic in male and female rats and probably also in mice. In Dr. Rueber's report, he agreed (page 5) that this FDA study (Hansen et al.) must be considered as an acceptable study, and thus the major difference in the conclusions of Dr. Rueber and the authors of this study derives primarily from differences in the interpretation and evaluation of the rat histopathologic data. Dr. Rueber agrees with the authors of the FDA study that 2,4-D was not shown to be carcinogenic in dogs but argues that two years is an insufficient study period to detect carcinogenesis in this species. It should be pointed out that carcinogenic effects have been produced in dogs in studies of less than 2-year duration, and the 2-year period is the recommended exposure period in the current FIFRA guidelines for chronic toxicity studies in dogs. The FIFRA Scientific Advisory Panel recommends that the Agency attempt to resolve the apparent controversy controversy between Dr. Rueber's pathological interpretation of the rat histologic findings and those of the authors of the FDA study before requesting any additional oncogenicity testing in rats with 2,4-D."

EPA has since contracted another review of the histopathologic data that did not support these contentions. BLM knows of no substantiation for Dr. Rueber's interpretation of these studies, but discord in interpretations constitutes scientific uncertainty and thereby dictates the need for addressing the carcinogenicity potential of 2,4-D with a worst-case analysis (Appendix N) (40 CFR 1502.22, see below).

The issue of carcinogenicity has also been raised in the case of picloram. A carcinogenesis bioassay of picloram in rats and mice was conducted by Gulf Research Institute for the National Cancer Institute (1978). This study found a relatively high incidence of foliar hyperplasia, C-cell hyperplasia and C-cell adenoma of the thyroid in both sexes of rats. The statistical tests for adenoma, however, did not show sufficient evidence for association of the tumor with picloram administration. There was evidence that picloram affected the livers of rats of both sexes. No tumors were found in male or female mice or male rats at incidences that could be significantly associated with treatment, and the study concluded that picloram was not carcinogenic for mice or male rats. In female rats, however, the incidence of neoplastic nodules (benign tumors) was associated with picloram treatment. The study concluded that under the bioassay conditions, the findings were suggestive of the ability of picloram to induce benign tumors in the livers of female Osborne-Mendel rats. According to a classification scheme devised by the National Cancer Institute (NCI), however, picloram was listed among chemicals where evidence for carcinogenicity in animals was equivocal at best (Griesmer and Cueto 1980).

From his examination of the histological sections, Rueber (1981) interpreted the results of the NCI bioassay differently when he concluded that picloram was carcinogenic for all test animals except mice tested at the lowest dose. This interpretation differs from that of the panel of experts (the former NCI Data Evaluation/Risk Assessment Subgroup of the Clearinghouse on Environmental Carcinogens), who were responsible for evaluating and interpreting the bioassay experiment.

Overall, Rueber's conclusions can be considered only as a single opinion on the carcinogenicity of picloram, differing drastically from the other 20 scientists who issued the NCI report.

The issue of carcinogenicity in glyphosate was raised by the U.S. Environmental Protection Agency (EPA) upon receipt of the results of a feeding study on mice. In that study, tumors (renal tubule adenomas) occurred in three out of 50 male mice fed a diet containing 30,000 parts per million (ppm) or 3 percent glyphosate. The same type of tumor was also found in one of 50 aminals fed 5,000 ppm (0.5 percent) glyphosate. The original pathology report indicated no renal tubule adenomas among 49 aminals fed 1,000 ppm (0.1 percent) glyphosate or among the control animals. EPA is reviewing this finding and have indicated that the evidence for oncogenicity, though present, is extremely limited. It should be noted that no statistically or biologically significant increases in tumors were found among female mice from the same study. In addition, a long-term oncogenic study conducted with rats was negative for oncogenicity. Several appropriately conducted and scientifically acceptable mutagenicity tests were also negative.

The National Environmental Policy Act (NEPA) Regulations (40 CFR 1502.22) state that "When an agency is evaluating significant adverse effects on the human environment in an EIS and there are gaps in relevant information or scientific uncertainty, the agency shall always make clear that such information is lacking or that uncertainty exists." NEPA regulations further state "...if the agency proceeds (in the face of uncertainty) it shall include a worst case analysis... ." In the case of picloram and 2,4-D, the scientific uncertainty arising from Rueber's conclusions indicates that data gaps exist. In the case of glyphosate, scientific uncertainty arises from the results of a recent feeding study in mice. BLM does not have the staff, expertise, or funds to fill the existing data gaps, and the time required to perform these studies would seriously delay the execution of state-mandated noxious weed control programs. To fill all the data gaps pertaining to the carcinogenicity potential of picloram, 2,4-D and glyphosate would require a total investment of between $3.5 million and $4.2 million and 5 years (see Appendix M).

Most if not all of the research to fill these data gaps for 2,4-D is being conducted by a taskforce of manufacturers. Research on picloram is being conducted by Dow Chemical Company (1984). Therefore, BLM's conducting such studies would constitute unneeded duplication. Additionally, the Ninth District Court, citing the requirements of NEPA *(Southern Oregon Citizens Against Toxic Sprays, Inc.. vs. James Watt et al., 1982),* ruled that BLM must perform a worst-case analysis evaluating the risks of using 2,4-D and assessing the probability of the worst case actually happening. Therefore, the worst-case analysis for 2,4-D, glyphosate and picloram is included as Appendix N.

No Treatment

The heavy pollen production of ragweed *(Ambrosia spp.)* and the common susceptibility of many individuals (20 million annually) makes ragweed one of the worst causes of hayfever in the United States. Contact with the milky sap of leafy spurge *(Euphorbia esula)* causes dermatitis with blisters and painful inflammation in humans (Hawkes and others 1985).

Some noxious and poisonous weeds directly affect human health. The toxic tremetol in snakeroot poisoned many people (milk-sickness) who drank milk from foraging cows that had fed on the plant (Muenscher 1961). Other evidence (Kilgore and others 1981) reveals that milk from goats having fed on *Lupinus latifolius* caused deformed kids, deformed puppies, and deformed bones in children (severe arm and hand deformitites, including partial absence of forearm and absent thumbs).

Veratrum californicum (false hellebore) is toxic to humans. Wild Solanum species (wild tomato and silver leaf nightshade) are poisonous, especially the green fruits that appear to be edible. Many people have been poisoned by eating seeds, sucking flower nectar, and making tea from the leaves of *Datura stramonium* (jimsonweed). *Cituta douglasii* (water hemlock) is the most poisonous plant in

North America, the ingestion of whose roots have caused cases of poisoning. The infamous "cup of hemlock" used to kill Socrates was derived from *Conium maculatum*. Many cases of human poisoning have occurred from mistaking roots and leaves for parsley, and roots and seeds for anise (Hulbert and Oehme 1961; Muenscher 1961).

The most efficient control of noxious weeds from best to worst would result from Alternatives 1, 2, and 3 respectively. The potential and real hazards of not controlling specific poisonous weeds would be the greatest under Alternative 4. The toxic and teratogenic hazards from drinking milk of animals foraging on snakeroot and lupines, would affect a small number of people. Teratogenic incidence would be highest in those areas and among those cultural niches where goats milk is a staple food.

Synergistic Effects

Synergistic effects of herbicides are those that occur because of simultaneous exposure to more than one herbicide and that cannot be predicted based on the effects of the individual chemicals.

Kocida and Mullison (1985) use a specific example of a mixture of 2,4-D and picloram to illustrate that the LD_{50} of each herbicide separately and the LD_{50} of the mixture do not demonstrate synergism since the LD_{50} of the mixture is between the LD_{50} of the two constituents. Therefore, synergism is not expected to occur in this program. See Appendix K, Synergistic Effect of Mixtures, for additional information.

Summary of Worst-Case Analysis

Because of data gaps in current information resulting in scientific uncertainty, BLM has presumed that in the absence of data, the worst-case would occur: i.e., that long term chronic effects would occur. The worst-case is discussed in depth in Appendix.

The risk of proceeding with the use of 2,4-D, glyphosate, or picloram in the face of scientific uncertainty was calculated presuming that some level of carcinogencity would result.

Two populations were considered in the analysis for the worst case; the worker and the public. Estimations of exposure to these groups were based on many conservative assumptions such as: mixing errors would occur, no protective clothing would be worn, that in the ingestion of food and water containing herbicide residues that no degradation of the chemical would occur, the dermal absorption rates were rounded off to higher levels, and the more conservative one-hit model for calculating the cancer potency and risk were used.

Even with these conservative assumptions, the highest risk under operational conditions would be to the worker exposed for 40 years at the maximum exposure from ground application methods. The probability of these carcenogenic effects was on the order of magnitude of two out of 10,000 workers exposed. This is similar to the risk of death from air polution. (Crouch and Wilson, 1982.)

Exposure to the public with the highest probability of cancer would be on the order of magnitude of two out of 100,000,000 from drinking water from a stream just sprayed with no dilution and being exposed for 20 days in this manner.

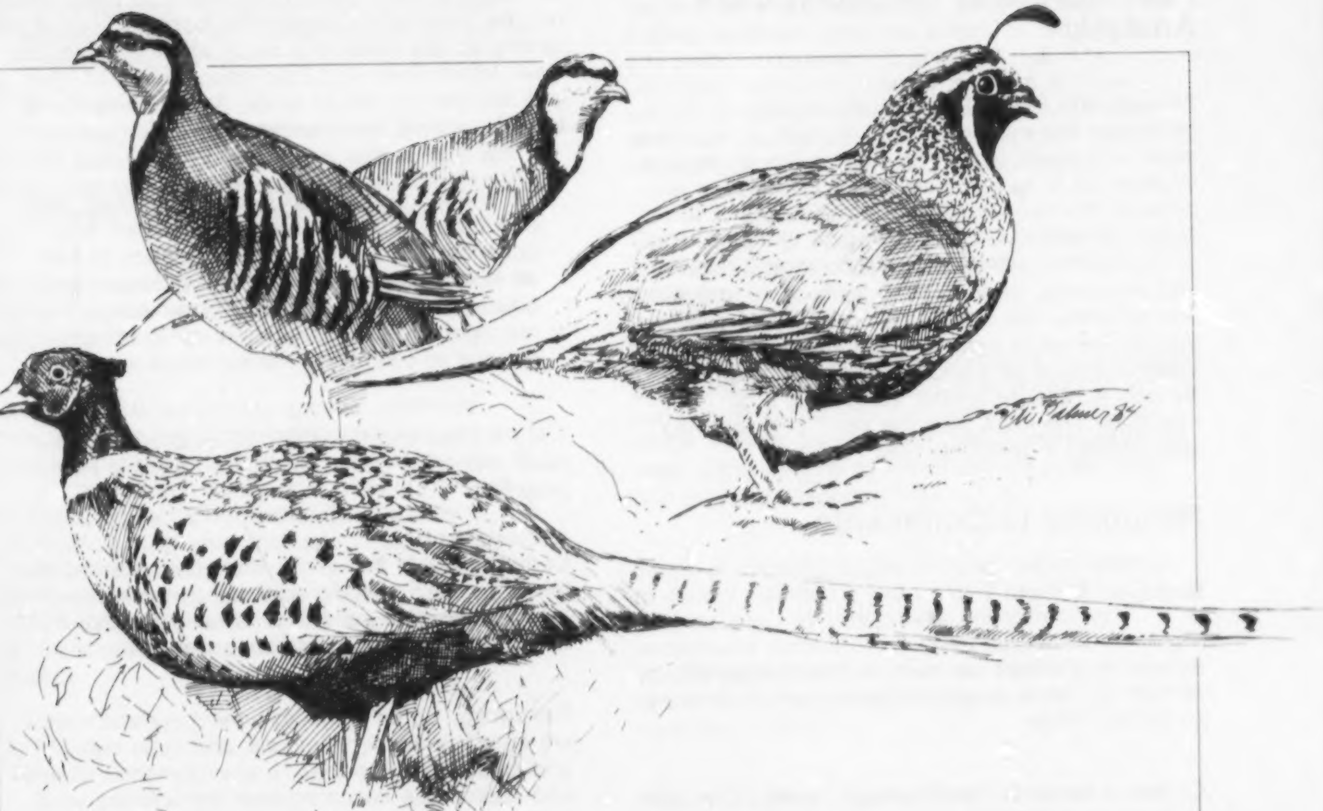
This probability of cancer is lower than the cancer probability from eating 0.5 pound of broiled steak per week (three out of 10 million) or drinking one pint of milk per day (two out of 1,000,000).

Under accident scenarios, both spills of concentrate herbicide on workers and truck and aircraft crashes were analyzed. These scenarios are not designed to show what will happen as a result of a given treatment operation, but rather what could happen when all of the conditions specified in the scenario are met in the actual operation. For instance, worker doses are based on no protective clothing which is actually contrary to BLM policy. The only scenario without an adequate margin of safety is the worker splashed with 2,4-D concentrate or the concentrate mixture, without protective gear and without washing off the chemical immediately after the accident. All public margins of safety exceeded 100 and in most cases are a 1000 times the no observable effect level.

Chronic carcinogenic probability was greatest also to the worker splashed with concentrate. This was on the order of magnitude of two out of 100,000 and similar to taking contraceptive pills (two out of 100,000). (Goldman, 1984.)

The highest probability of getting cancer by the public through drinking 1 liter of water containing herbicides residue after a major spill was on the order of magnitude of two in 100 million. This probability of cancer is much lower than the probability of death by storms in the U.S. (eight out of 10 million), bites of venomous creatures (two out of 10 million), or an earthquake in California (16 out of 10 million).

Chapter 4—Consultation and Coordination on the Draft Environmental Impact Statement



Introduction

This Environmental Impact Statement (EIS) was prepared by an interdisciplinary team of specialists from the five-state EIS area and Cornell University. Writing of the EIS began in March 1985. Consultation and coordination with agencies, organizations and individuals occurred throughout the time this document was being written, both in draft and final form.

Public Participation

In February 1985 a notice was published in the Federal Register and news media announcing the scoping period for the EIS (See Appendix B for results of scoping). A draft EIS was made available to the public on May 30, 1985. The draft stated that the public comment period would end July 31, 1985. Public meetings were held during the comment period in Roseburg, Baker, Wenatchee, Boise, Pocatello, Missoula and Miles City. The results of these meetings are available for review at the Oregon State Office.

Peer Review of the Worst Case Analysis

Although the Bureau of Land Management performed the worst-case analysis with an in-house team, a contract was let for peer review by experts. Because BLM has little toxicological expertise and because the need to ensure the accuracy of this worst-cast analysis, Labat-Anderson, Inc., a consultant firm with in-house toxicological expertise and experience in performing worst-case analysis was retained. The contract for peer review specified that the review of both the draft and final worst-case analysis should be performed by a toxicologist, a statistician, and an animal toxicologist at a minimum. The input from the peer reviewers was incorporated in this Final EIS.

Response to Comments

Common Issues

A number of broad issues were raised frequently by reviewers. These issues and responses to them are presented below.

Common Issue 1: The Proposed Action (Alternative 1) is not an integrated pest management program because it relies mainly on chemical herbicides.

Response: As a system that uses a variety of techniques to control unwanted plants or animals, integrated pest management (IPM) does not imply that chemicals would be used only as a last resort. Both effectiveness and economic efficiency would be considered in making site-specific decisions among the options. A high proportion of the expected control acreage is proposed for spraying with herbicides because existing information on infestations and the relative effectiveness and costs of possible control programs reveal that spraying is the best way to achieve a reasonable amount of control. Research into alternative control methods may in the not-distant future show that alternative techniques will do the job in some of the situations now proposed for herbicide spraying. Because the Proposed Action is an IPM alternative, alternatives to chemical herbicides would be adopted when and where they are found to be effective and efficient.

Common Issue 2: The benefits shown do not justify the program—the costs outweigh the benefits.

Response: The main benefit of the noxious weed control on public lands is not only the prevention of economic losses related to activities on these lands but the prevention of economic losses sustained on nearby private lands that result when uncontrolled weed infestations on public lands spread to infest and reinfest the private lands. As the Governor of Montana stated in comment letter 64:

> "If weeds are not controlled or contained, they provide a constant source of infestation and economic impact to all adjacent lands as well as to land downstream. BLM involvement in areawide or community-wide coordinated management projects is the most practical solution to controlling the spread of weeds."

The Purpose and Need section of Chapter 1 has been revised to better reflect the rationale for this program.

Common Issue 3: Several letters commented on the need to be specific on buffer zone requirements for surface waters, and several assumed that BLM would be relying solely on state standards.

Response: Buffer zones to protect surface waters are based on local conditions, and state regulations and guidelines. Site-specific environmental analysis and appropriate documentation will address what buffer zones are needed to protect water quality, riparian habitat, and fisheries.

Common Issue 4: Several letters suggested changes in Appendixes A and D.

Response: Appendix A simply reprints the two Federal Laws that deal specifically with noxious weeds. It will not be changed. Additions have been made to the maps (Appendix D) showing distribution and spread of selected noxious weeds in response to comments.

Common Issue 5: Several letters expressed concern about monitoring and studies.

Response: The general guidelines for weed control monitoring are as follows (monitoring may vary from state to state depending on funding levels and other considerations):

> Pre-treatment—(1) representative sites will be selected for soil types, slope, and vegetation; (2) visual on-site checks will be made of both target and nontarget species; and (3) photo points may be established.
>
> Post-treatment—(1) on-site checks to assess effects on target and nontarget species will be made; and (2) photos may also be taken.
>
> Pre-treatment and post-treatment vegetation and water quality monitoring and studies will be addressed in site-specific environmental analyses with appropriate documentation.

Common Issue 6: Several letters commented on indirect and direct effects on vegetation, water, wildlife, and other resources.

Response: In addition to specific comment responses and text changes addressing some of these concerns, a brief description of the size of areas treated with herbicides, rates of herbicide application, herbicide selectivity, and time of application have been included in Chapter 1 (Weed Management Treatments, Chemical Methods) to clarify the magnitude of the program and put it more in perspective. This may help alleviate some of the concerns people have on direct and indirect effects.

Common Issue 7: Several letters commented on the spread of weeds.

Response: Weed species are spread by one or both of the following means:

(A) All weed species are spread by seed. The methods of seed dispersal include (1) wind; (2) water; (3) animals, including humans; (4) crop seed, grain, hay, and straw; (5) machinery, including automobiles, motorcycles, trucks, and cargo and other machines; (6) weed screening; (7) use of weeds as ornamental plants, and (8) sale of wildflower seeds that include the seeds of such noxious weeds as knapweed.

(B) Vegetative reproduction occurs by stems, roots, leaves, or modifications of these basic organs such as rhizomes (underground horizontal stems), tubers, corms, bulbs, and bulblets. Humans are the greatest agent of this method of spread.

Weeds do not spread by just one method, but humans are the most important agent of their spread. Almost all noxious weeds are introduced plants from foreign countries, some introduced as impure seed and food and others as ornamentals and packing material. All groups affected by noxious weeds should become aware of these weeds, be able to identify them, and be familiar with their methods of spread so that preventative weed control programs can be effective.

Common Issue 8: Several letters expressed concern about the nature of biological control methods.

Response: Biological weed control is the deliberate use of natural enemies (parasites, predators, or pathogens) to reduce weed densities to tolerable levels. Insects are the main natural enemies being used. Other natural enemies include mites, fungi, and nematodes (pathogens).

Some of the advantages of using natural enemies to control weeds are that (1) they are self-perpetuating, (2) they can be comparatively economical once studied and established, (3) they can be highly selective, (4) they offer a high degree of environmental safety, and (5) they do not require fossil fuel energy.

Biological control, however, does have limitations because (1) it is a slow process, (2) it does not achieve eradication but merely reduces weed densities to more tolerable levels, (3) it is highly selective, attacking one weed existing among a complex of other weeds, (4) it cannot be used against weeds that are valued under some situation because insects or pathogens do not recognize boundaries, (5) it cannot be used against weeds that are closely related to beneficial plants because the insects or pathogens may be unable to discriminate between related plant species, (6) it cannot be used against weeds when it requires an alternate host that may be a beneficial plant, and (7) it cannot be combined with the use of herbicides in the same area.

Although discussed as biological agents, sheep and goats are not truly biological agents but are domestic animals used to control only the **topgrowth** of certain noxious weeds. The following are some of the advantages of using sheep or goats for noxious weed control: (1) they use weeds as a food source, (2) following a brief adjustment period, they sometimes consume as much as 50 percent of their daily diets of this species, (3) average daily gains of offspring grazing certain weed-infested pastures can sometimes be significantly higher than average daily gains of offspring grazing grass pastures, and (4) sheep or goats can be used in combination with herbicides.

Some of the disadvantages of using sheep or goats are (1) they also use nontarget plants as food sources, (2) the use of sheep or goats requires a herder or temporary fencing, (3) sheep and goats may be killed by predators such as coyotes, (4) heavy grazing of some weed species, such as leafy spurge, tends to loosen the stool of the grazing animals, and (5) most weed species are less palatable than desirable vegetation and would cause overgrazing.

To develop a biological weed control program, the following steps must be taken:

(1) Identify weed species and determine origin.
(2) Determine if any natural enemies occur at the point of origin.
(3) If possible, collect natural enemies.
(4) Hold preliminary screening trials on the natural enemies of the weed in the United States.
(5) Hold further screening trials in the United States.
(6) Raise biological control agents before first release.
(7) Release biological control agents for first time onto selected sites.
(8) If biological control agents survive and increase in numbers, collect agents and release onto other sites of weed infestation.

Usually a complex of three to five different biological agents, such as insects, must be used to attack an individual weed infestation site. But even with a complex of biological agents, often 15 to 20 years are needed to bring about an economic control level, especially on creeping perennials. In most circumstances, biological control agents are not performing control. They are only creating stresses on the weeds, which is not the same as control.

As biological control agents become available, BLM will continue to increase their use. Estimated costs to develop a biological control program per weed are as follows.

(1) Overseas studies, involving the survey, biological investigation, and collection of organisms attacking the weed: $1.2 million to $1.5 million.

(2) Survey of organisms already present on weeds in other countries, such as Canada, or other states: $300,000.

(3) Screening studies to determine the host range and safety of the candidate biological control agent: $150,000.

(4) Post-release studies to determine the survival and impact of the agent on the weed: $75,000.

(5) Collection from an established population of biological control agents and release to new areas of weed infestation: $3 to $15 per acre.

pecific Written Comments

h person, organization or agency that provided ten comments was assigned an index (letter) nber in consecutive order as received. Appendix erial was enclosed with letters 39, 43, 59, and and is available for review at the Oregon State ce.

ter

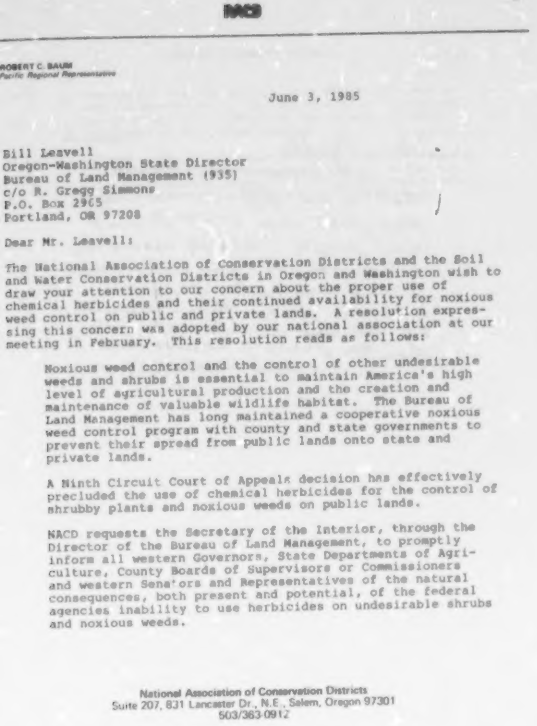
Agency, Organization or Individual

National Association of Conservation Districts—Salem, Oregon
USDA-Soil Conservation Service—Oregon State Conservationist
University of Idaho—Professor Lambert C. Erickson
Kay Nollenberger
Montana Historical Society—Helena, Montana
USDA-Soil Conservation Service, Idaho State Conservationist
Mary L. Cookman
Executive Department—Intergovernmental Relations Division, Oregon
USDA—Soil Conservation Service, Montana State Conservationist
Morrow County Weed Control, Heppner, Oregon
Oregon Natural Heritage Data Base, Portland, Oregon
Idaho Department of Lands, Soil Conservation Commission
Idaho Department of Agriculture, Weed Control Coordinator
Idaho Farm Bureau Federation, Pocatello, Idaho
Montana Department of State Lands, Reclamation Division
Harry McNeal
USDI-Bureau of Reclamation, Boise, Idaho
Montana State University, Cooperative Extension Service
Washington Department of Natural Resources, Lands Division
Thomas Haensly
Wood River Resource Conservation and Development Area, Gooding, Idaho
George Wooten
Coos-Curry Council of Governments, Coos Bay, Oregon
Valley County Weed Control, Glasgow, Montana
Prairie County Weed Board, Terry, Montana
Wyoming Farm Bureau, Laramie, Wyoming
University of Idaho, Fremont County Extension Agricultural Agent
Valley County Board of County Commissioners, Glasgow, Montana

29. Tri-State Weed Coordinating Committee, Logan, Utah
30. Bonneville County Weed Control, Idaho Falls, Idaho
31. Idaho Department of Fish and Game
32. Tillamook County Soil and Water Conservation District, Oregon
33. Washington State Department of Game
34. Wyoming Office of the Governor
35. University of Idaho, Custer County Extension Agent
36. Montana State Rural Areas Development Committee
37. Tom Chivers, Custer County Commissioner, Challis, Idaho
38. Michael Pilarski
39. Fred H. Mass
40. Oregon State Department of Agriculture, Weed Control Program
41. Washington State Department of Fisheries
42. John R. Swanson
43. Southern Oregon Northwest Coalition of Alternatives To Pesticides
44. Natural Resources Defense Council, Inc., San Francisco, California
45. Earth First, Grants Pass, Oregon
46. Prairie County Cooperative State Grazing District, Terry, Montana
47. Richland County Weed Board, Sidney, Montana
48. Montana State University, Richland County Agent
49. Prairie County Conservation District, Terry, Montana
50. Washington Native Plant Society, Seattle, Washington
51. USDI-National Park Service, Pacific Northwest Region
52. Audubon Society of Portland
53. Montana State University, Extension Weed Specialist
54. Okanogan County Cattlemen's Association
55. Department of Energy Bonneville Power Administration
56. Idaho Natural Resources Legal Foundation, Inc.
57. Okanogan County Noxious Weed Control Board, Washington
58. U.S. Senator Steve Symms, State of Idaho
59. Northwest Coalition for Alternatives to Pesticides
60. Idaho Cattle Association, Boise, Idaho
61. USDA-Forest Service, Washington, DC
62. USDI-Geological Survey, Reston, Va.
63. Montana Public Lands Council, Helena, Montana
64. State of Montana, Office of the Governor
65. USDC-National Oceanic and Atmospheric Administration, Washington,DC
66. Washington State University, Ferry County Extension Agent

67. Idaho Wool Growers Association, Boise, Idaho
68. The Nature Conservancy, Fort Collins, Colorado
69. National Wildlife Federation, Missoula, Montana
70. Department of the Army, Corps of Engineers, North Pacific Division
71. U.S.Environmental Protection Agency, Region 10
72. Washington State Department of Ecology

1



NACD

ROBERT C. BAUM
Pacific Regional Representative

June 3, 1985

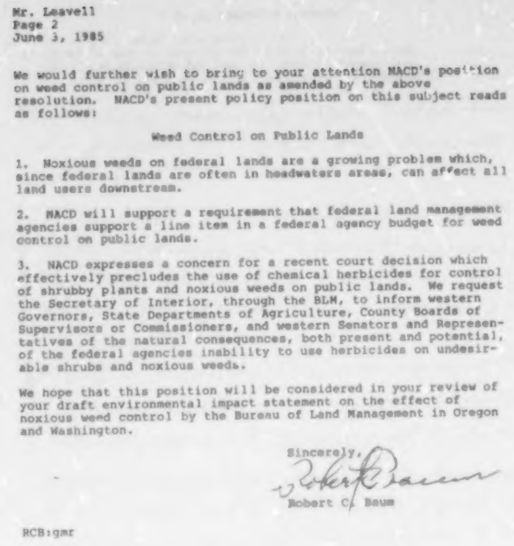
Bill Leavell
Oregon-Washington State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Mr. Leavell:

The National Association of Conservation Districts and the Soil and Water Conservation Districts in Oregon and Washington wish to draw your attention to our concern about the proper use of chemical herbicides and their continued availability for noxious weed control on public and private lands. A resolution expressing this concern was adopted by our national association at our meeting in February. This resolution reads as follows:

> Noxious weed control and the control of other undesirable weeds and shrubs is essential to maintain America's high level of agricultural production and the creation and maintenance of valuable wildlife habitat. The Bureau of Land Management has long maintained a cooperative noxious weed control program with county and state governments to prevent their spread from public lands onto state and private lands.
>
> A Ninth Circuit Court of Appeals decision has effectively precluded the use of chemical herbicides for the control of shrubby plants and noxious weeds on public lands.
>
> NACD requests the Secretary of the Interior, through the Director of the Bureau of Land Management, to promptly inform all western Governors, State Departments of Agriculture, County Boards of Supervisors or Commissioners and western Senators and Representatives of the natural consequences, both present and potential, of the federal agencies inability to use herbicides on undesirable shrubs and noxious weeds.

National Association of Conservation Districts
Suite 207, 831 Lancaster Dr., N.E., Salem, Oregon 97301
503/363-0912



Mr. Leavell
Page 2
June 3, 1985

We would further wish to bring to your attention NACD's position on weed control on public lands as amended by the above resolution. NACD's present policy position on this subject reads as follows:

Weed Control on Public Lands

1. Noxious weeds on federal lands are a growing problem which, since federal lands are often in headwaters areas, can affect all land users downstream.

2. NACD will support a requirement that federal land management agencies support a line item in a federal agency budget for weed control on public lands.

3. NACD expresses a concern for a recent court decision which effectively precludes the use of chemical herbicides for control of shrubby plants and noxious weeds on public lands. We request the Secretary of Interior, through the BLM, to inform western Governors, State Departments of Agriculture, County Boards of Supervisors or Commissioners, and western Senators and Representatives of the natural consequences, both present and potential, of the federal agencies inability to use herbicides on undesirable shrubs and noxious weeds.

We hope that this position will be considered in your review of your draft environmental impact statement on the effect of noxious weed control by the Bureau of Land Management in Oregon and Washington.

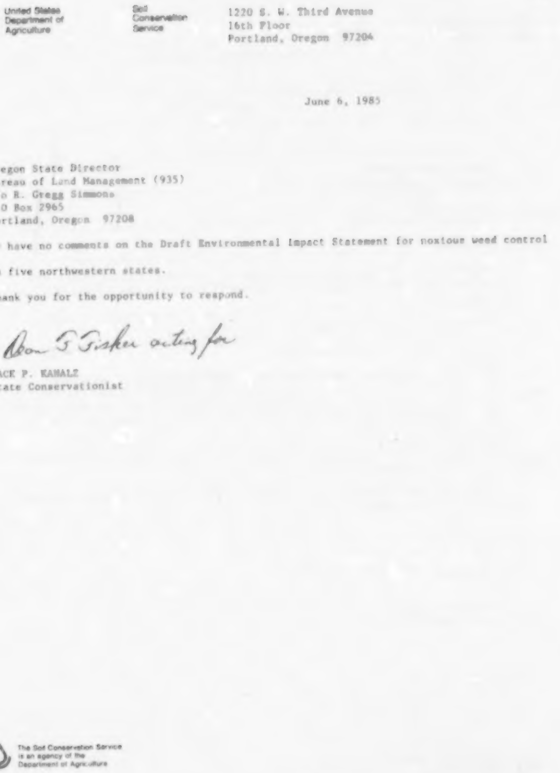
Sincerely,

Robert C Baum

Robert C. Baum

RCB:gmr

2



United States
Department of
Agriculture

Soil
Conservation
Service

1220 S. W. Third Avenue
16th Floor
Portland, Oregon 97204

June 6, 1985

egon State Director
reau of Land Management (935)
o R. Gregg Simmons
O Box 2965
rtland, Oregon 97208

have no comments on the Draft Environmental Impact Statement for noxious weed control

five northwestern states.

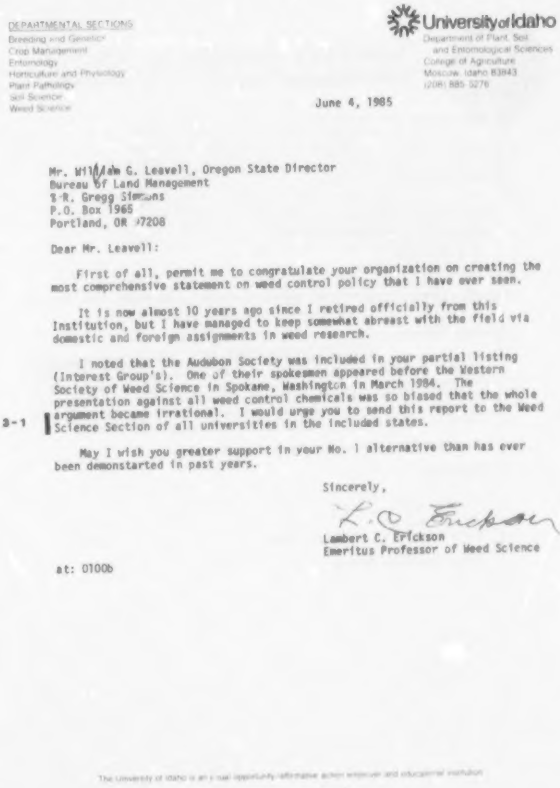
ank you for the opportunity to respond.

Don F Fisher acting for

ACK P. KANALZ
tate Conservationist

The Soil Conservation Service
is an agency of the
Department of Agriculture

3



DEPARTMENTAL SECTIONS
Breeding and Genetics
Crop Management
Entomology
Horticulture and Physiology
Plant Pathology
Soil Science
Weed Science

University of Idaho
Department of Plant, Soil
and Entomological Sciences
College of Agriculture
Moscow, Idaho 83843
(208) 885-5276

June 4, 1985

Mr. William G. Leavell, Oregon State Director
Bureau of Land Management
% R. Gregg Simmons
P.O. Box 1965
Portland, OR 97208

Dear Mr. Leavell:

First of all, permit me to congratulate your organization on creating the most comprehensive statement on weed control policy that I have ever seen.

It is now almost 10 years ago since I retired officially from this Institution, but I have managed to keep somewhat abreast with the field via domestic and foreign assignments in weed research.

I noted that the Audubon Society was included in your partial listing (Interest Group's). One of their spokesmen appeared before the Western Society of Weed Science in Spokane, Washington in March 1984. The presentation against all weed control chemicals was so biased that the whole argument became irrational. 3-1 I would urge you to send this report to the Weed Science Section of all universities in the included states.

May I wish you greater support in your No. 1 alternative than has ever been demonstarted in past years.

Sincerely,

L. C. Erickson

Lambert C. Erickson
Emeritus Professor of Weed Science

at: 0100b

The University of Idaho is an equal opportunity/affirmative action employer and educational institution

RESPONSE TO COMMENT LETTER 3

3-1 BLM has made an effort to send at least one copy of the EIS to each community college, college, and university in the EIS area.

4

Dear People: June 6

It angers me deeply that in an effort to show that picloram & 24D don't hurt people (which everyone knows they do) you are sacrificing animals. Give us a break! Julia Burns is right why not use the unemployed to "clear" the forests of hardwoods?

Kay Nollenbeer

5

MONTANA HISTORICAL SOCIETY

225 NORTH ROBERTS STREET • (406) 444-2694 • HELENA, MONTANA 59620-9990

June 12, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

RE: Draft Environmental Impact Statement - Northwest Area Noxious Week Control Program

Dear Sir:

Thank you for the opportunity to comment on the document identified above. We find its description of cultural resources and its short assessment of how cultural resources might be affected by weed control activities to be accurate. BLM's commitment to insure identification, evaluation, and, where appropriate, avoidance or mitigation of significant cultural resources prior to taking any agency action is sound.

Thank you again for the opportunity to comment.

Sincerely,

Marcella Sherfy,
State Historic Preservation Officer

File: Comp/BLM, General

6

United States Department of Agriculture

Soil Conservation Service

Room 345, 304 North 8th Street
Boise, Idaho 83702

June 19, 1985

Oregon State Director
Bureau of Land Management
C/O R. Gregg Simmers
P.O. Box 2965
Portland, Oregon 97208

Dear Sirs:

Thank you for the opportunity to review and comment on the Northwest Area Noxious Weed Control Program, Environmental Impact Statement Draft, May 1985.

We have the following comments:

1. We support the proposed action.

6-1 2. We are concerned that in areas where the noxious weed species now comprise 90-100% of the plant composition, control of these species might leave the land area vulnerable to erosion by wind or water. When these situations occur, are there plans to apply seeding practices following treatment?

6-2 3. On all control areas, are there plans to follow control implementation with a period of special livestock management?

We believe the above concerns should be addressed in this documentation or some companion document.

Sincerely,

Thomas Wehri (Acting)

Stanley N. Hobson
State Conservationist

RESPONSE TO COMMENT LETTER 6

6-1 The need for rangeland rehabilitation will be addressed by each BLM district on a project-specific basis. If the need for rehabilitation is identified, then it will be made a requirement of the treatment project.

6-2 The need for special livestock management will be addressed by each BLM district on a project-specific basis. If the need for special livestock management is identified, then it will be made a requirement of the follow-up to the treatment project.

BLM – Portland office **7**
June 27, 1985

Dear Mr. Simmons;

Please answer a couple of questions.

7-1 1. What's a noxious weed? who sits in judgement? What are their economic interests?

7-2 2 "The draft" addresses human health. When working with "worst-case analysis" do "they" give any thought or study to the health of wildlife – insects, frogs birds etc?

7-3 3. When it comes to a decision of trees versus wildlife – has wildlife any Chance against timber interests?

Wildlife certainly seems to be loosing where 1080's return is concerned. An odorless, tasteless lethal poison is being promoted for the economic health of the sheep industry at great costs to wildlife. If —— timber and sheep industries – cannot manage their own why must wildlife – with our tax-supported bureaus be sacrificed to enhance their economic gain?

Dams are built for the economic interests of "developers" at the costs of the destruction of anadromous fish.

How much can nature take to survive man's management? Man's tract record is slipping, considering his hazardous and toxic waste.

Economic gain seems always at a cost of environmental loss. Can't you do something to change that?

Sincerely,
Mary L Cookman
11401 Upper Cow Ck Rd
Azalea, Or 97410

RESPONSE TO COMMENT LETTER 7

7-1 Noxious weed, as defined by the Federal Noxious Weed Act of 1974 (PL 93-629), is listed in the Glossary of the DEIS. In addition, states in the EIS area define noxious weeds in their respective noxious weed laws. Idaho, for example, defines noxious weed as "any plant which is determined by the director (of the State Dept. of Agriculture) to be injurious to public health, crops, livestock, land or other property." Each state in the EIS area has its own list of declared noxious weeds, some of which are listed in Appendix C of the DEIS. County weed boards may also designate noxious weeds. A weed doesn't have to be exotic (non-native) to be declared noxious.

7-2 Impacts on wildlife that would result from implementing each alternative are presented in Chapter 3 of the EIS. A worst-case analysis of impacts on wildlife was not conducted. Also see response to comment 71-33.

7-3 It is not within the scope of this EIS to address tradeoffs between timber production and wildlife.

8

Executive Department
155 COTTAGE STREET NE., SALEM, OREGON 97310

July 9, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

SUBJECT: Northwest Area Noxious Weed Control Program
PNRS # OR850529-061-4

Thank you for submitting your draft Environmental Impact Statement for State of Oregon review and comment.

Your draft was referred to the appropriate state agencies for review. The Department of Forestry, Division of State Lands and East Central Oregon Association of Counties offered the enclosed comments, which should be addressed in preparation of the final Environmental Impact Statement.

We will expect to receive copies of the final statement as required by Council of Environmental Quality Guidelines.

Sincerely,

INTERGOVERNMENTAL RELATIONS DIVISION

Dolores Streeter
Dolores Streeter
Clearinghouse Coordinator

DS:bm
Enclosures

OREGON INTERGOVERNMENTAL PROJECT REVIEW

State Clearinghouse
Intergovernmental Relations Division
155 Cottage Street N. E.
Salem, Oregon 97310

NW States

Phone (503)378-3732 or Toll Free in Oregon 1-800-422-3600

STATE AGENCY REVIEW

Project Number: OR 850529-061-4 Return Date: JUL 05 1985

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

If you cannot respond by the above return date, please call to arrange an extension at least one week prior to the return date.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

☐ This project has no significant environmental impact.

☒ The environmental impact is adequately described.

☐ We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement.

☐ No comment.

Remarks

Comments attached.

Agency Forestry By Roy Miller
IPR #5

Forestry Department
OFFICE OF STATE FORESTER
2600 STATE STREET, SALEM, OREGON 97310 PHONE 378-2560

June 13, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

Thank you for the opportunity to review the Draft Environmental Statement on the Northwest Area Noxious Weed Control Program.

We support Alternative 1 which considers the full range of chemical, manual, mechanical and biological weed control methods. The actual selection of a specific method at individual sites will comply with all federal, state and local laws and regulations.

Sincerely,

H. Mike Miller
State Forester

HMM/BB:jp

OREGON INTERGOVERNMENTAL PROJECT REVIEW

State Clearinghouse
Intergovernmental Relations Division
155 Cottage Street N. E.
Salem, Oregon 97310

Biologist

NW States

Phone (503)378-3732 or Toll Free in Oregon 1-800-422-3600

STATE AGENCY REVIEW

Project Number: OR 850529-061-4 Return Date: JUL 05 1985

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

If you cannot respond by the above return date, please call to arrange an extension at least one week prior to the return date.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

☐ This project has no significant environmental impact.

☐ The environmental impact is adequately described.

☒ We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement.

☐ No comment.

Remarks

8-1 The final EIS should explain the types of biological methods to be utilized for weed control.

RECEIVED
MAY 30 1985
DIVISION OF STATE LANDS

Agency Lands By
IPR #5

LOCAL CLEARINGHOUSE REVIEW

ubmitted by: EAST CENTRAL OREGON ASSOCIATION OF COUNTIES (ECOAC)
Name of Local Clearinghouse

NRS # OR850529-061-4

ROJECT: Applicant Bureau of Land Management
Title NW Area Noxious Weed Control Program (Draft EIS)
County Entire State of Oregon

OMMENTS:

[ ] Approval

[ ] No comment

[X] Project has no adverse effect

[ ] Project has adverse effects (Explanation attached)

[X] Comments attached

RETURN TO STATE CLEARINGHOUSE
155 Cottage St. NE
Salem, OR 97310

(4/85)

PNRS #OR850529-061-4 (Noxious Weed Control)

Additional Comments:

Board members noted that Eastern Oregon has a problem with noxious weeds, and wonder if the problem is more than is noted in the Oregon location map in the statement, on related BLM lands. In addition, because there are locally established weed control districts in Eastern Oregon, members suggested BLM coordinate with these local groups for identification of problem areas, and implementation of the control plan. This joint effort could possibly create some cost savings, or cost-sharing programs that would benefit both parties. 8-2

RESPONSE TO COMMENT LETTER 8

8-1 See response to common issue 8.

8-2 Oregon BLM districts do coordinate with local weed control districts on a project-specific basis (see Interrelationships section page 16 of the DEIS).

9

United States Department of Agriculture
Soil Conservation Service
Federal Building, Room 443
10 East Babcock Street
Bozeman, MT 59715

July 1, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

RE: Northwest Area Noxious Weed Control Program Draft EIS

Dear Mr. Simmons:

We have reviewed the above draft EIS and have no comments to offer.

Sincerely,

Glen H. Loomis
State Conservationist

cc: Ron Batchelor, State Biologist, SCS, Bozeman, MT

10

MORROW COUNTY WEED CONTROL

P.O. Box 127
Heppner, OR 97836

Phone (503) 676-5452

July 10, 1985

Oregon State Director
Bureau of Land Management (935)
R. Gregg Simmons
P.O. Box 2965
Portland, OR

Dear Mr. Simmons:

I am writing to comment on the Northwest Area Noxious Weed Control Program EIS. I have reviewed the statement and find alternative 1 (PA) to be the only practical method of combatting the fight against the spread of noxious weeds.

10-1 I feel that Rush skeleton weed chondrilla juncea should be moved from the list of noxious and troublesome weeds to be considered for treatment to the list of noxious weed target species to be treated. This weed presents a great economic threat on the large wheat producing areas of the Northwest. Should Rush skeleton weed get established, wheat production could drop as much as 70%.

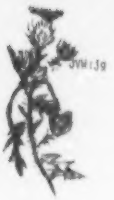
10-2 Why isn't Oregon going to have any herbicides applied aerially? According to your tables (1-1, Acres Affected by Noxious Weeds in EIS Area) Oregon has more acres infested with weeds than any of the other four states. Is there some reason for not using a helicopter?

I am concerned with the spreading of noxious weeds in the Pacific Northwest and will be glad to help in any way if needed.

Sincerely,

Jim Van Winkle

Jim Van Winkle
Morrow County Weed Supervisor



JVW:jg

RESPONSE TO COMMENT LETTER 10

10-1 It is difficult to to give a priority for treatment to all noxious weeds in the EIS area. During site-specific analysis and documentation, each BLM district will set priorities for control by species or groups of species in cooperation with local state and county weed control authorities.

10-2 Aerial application of herbicides in Oregon was not proposed because proposed treatment areas would not satisfy the conditions for aerial application. These conditions include, large individual areas to be treated, remoteness, and inaccessibility by ground vehicle. In addition, ground application methods would accomplish the task as efficiently in Oregon's situation.

11

Oregon Natural Heritage
Data Base

1234 NW 25th Avenue · Portland Oregon 97210 · (503) 228-9550

July 10, 1985

William G. Leavell
Bureau of Land Management
c/o R. Greg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Greg,

Thank you for giving the Oregon Natural Heritage Data Base the opportunity to comment on the Northwest Area Noxious Weed Control Program Draft EIS. We understand the necessity to control weeds in the Northwest in order to preserve native species and plant communities. Furthermore we understand the desire to actively pursue management of certain weedy species in certain areas of the Northwest. However we have serious reservations about endorsing the program presented in the draft EIS due to some apparent inadequacies in the document.

The primary concern that the Oregon Natural Heritage Data Base has with the noxious weed control program is its effects on native plant and animal species in the control area. The program, as outlined, covers vast areas of Oregon that contain many rare, threatened and endangered species of plants and animals and encompasses many protected natural areas with representative examples of native communities. The application of herbicides over this area at the proposed annual rate of acres treated represents a great number of unknowns with regards to the potential impacts on rare species. These issues are poorly addressed in the EIS as are the effects of other means of weed control on these species. For this reason we cannot support any of the proposed alternatives as presented.

The treatment of potential impacts of the program on rare plants in the EIS is very short and their is no indication that experts on any of the rare species that are found in the affected areas were consulted. Besides the direct effect of spraying or mechanical eradication efforts, there are numerous indirect effects on vegetation, such as groundwater and soil alteration, that are only briefly discussed. Also the effects of large scale
11-1 vegetation removal from areas will almost certainly have a significant impact on the remaining plants in the area. This impact will not always take the form of a release from competition but rather can result in the destruction of micro-habitats that are absolutely essential for the survival of many of our native species of plants and animals.

The list of threatened and endangered animals in Table 2-1 is encouraging to see in the document, even though it contains several errors in the reported status of the species. For instance, the Borax Lake chub is listed as only having an
11-2 "occurrence" in Oregon when in reality the only site of this species in the world is in Oregon and its actual status is endangered. There are also several animal species that were excluded from the list for no apparent reason. We were concerned about the omission of a similar list of threatened and endangered plant species from the EIS, which is curious since plants will be directly affected by any weed control efforts.

Within the list of alternative methods for weed control there was a limited proposed use of prescribed burning. This technique has been used extensively in the rejuvenation of rangelands in the inland northwest with very good results. There is usually a significant decrease in weedy cover and a corresponding increase in native species cover with few negative impacts to rare, threatened and endangered species. The impacts of burning on
11-3 wildlife as discussed on page 43 of the EIS are somewhat misleading and need further clarification. It may be true that there is a temporary displacement of resident wildlife species by fire but given the usual small size of the treated area there is typically good habitat very close by. There is also a surprising number of animals that survive prescribed burns in burrows or by merely escaping the fire if the burn is not conducted during nesting season. For these reasons we feel that prescribed burning conducted in the appropriate season is the safest and most cost effective method available. We would support a weed control alternative that is based on prescribed burning.

Another comment that needs to be addressed more fully in the final EIS for this program is related to Appendix I under "Monitoring and Studies". We are supportive of monitoring efforts aimed at water quality in streams and the fisheries resource. However there is a glaring omission made in this section with regards to monitoring of the affected vegetation in weed control areas. The
11-4 lack of any discussion of monitoring studies on native vegetation, including shrubs, grasses, herbs and threatened and endangered species anywhere in this document is unacceptable. Since the primary target of the entire program is weedy vegetation control it is also surprising there is little mention of proposed studies to evaluate the effectiveness of the program in general and of the individual techniques in particular. Without these studies there will be no way to determine if the desired results are being achieved and if rare species and native vegetation in general are being maintained or actually enhanced.

The final comment we have on the EIS pertains to Appendix E, the

11-5 list of common weeds in the affected area. We were dismayed to see over 300 species of plants, many of which are native to the area, included in the list. Upon checking the Glossary in the EIS we found that "weed" was defined as "a plant out of place or growing where not desired". This definition seems to disregard the concept of natural communities and the basic goals of land management to maintain such communities. A more strict definition of "weed" would perhaps be better suited to the noxious weed control program, whereby weeds are defined as introduced species that have significantly disrupted native plant communities and are displacing native species. This definition better fits the weed species of concern listed on page 21 under the heading "noxious weeds and poisonous plants" and also listed in Appendix C-1.

We sincerely hope that these above comments will be incorporated in the final EIS. Our concern for native species and communities has prompted our review and comments of the EIS and is our overriding interest in the program. We would be happy to work with your staff on correcting the inadequacies in the EIS, as stated above. Please feel free to contact us on any matters addressed in this letter, especially with regards to rare, threatened and endangered species. We would like to be kept informed on individual environmental assessments of specific projects in this weed control program in Oregon as they are planned.

Thank you for your consideration.

Sincerely,

Dick VanderSchaaf

Dick Vander Schaaf
Public Lands Protection Planner

RESPONSE TO COMMENT LETTER 11

11-1 Large scale vegetation removal will not result from implementation of this program. See the revised text in Chapter 1 (Weed Management Treatments, Chemical Methods) for a brief description of the size of areas to be sprayed. By following guidelines stated in the EIS, herbicide label recommendations, and recommendations of university researchers, injury to nontarget species would be minimized.

11-2 Table 2-1 lists threatened and endangered animals species occurring within the EIS area. Some errors in this table were pointed out in the comment letters. Revisions have been made.

11-3 There are three threatened and endangered plants in the EIS area. See page 24 of the DEIS. Threatened and endangered plants would be protected. See page 7 of the DEIS.

11-4 The text has been revised (see Chapter 3, Impacts on Wildlife) to clarify the discussion of impacts of burning.

11-5 A discussion of monitoring and studies applicable to BLM's noxious weed control program is presented in the DEIS, see Chapter I and Appendix I. Also see response to common issue 5 for additional clarification.

11-6 The title of Appendix H has been revised to clarify that it addresses the susceptibility of herbaceous plants (not weeds) to 2,4-D, dicamba, picloram, and glyphosate herbicides. Also see response to comments 7-1 and 45-3.

12

SOIL
CONSERVATION
COMMISSION
801 South Capitol B[illegible], Boise, Idaho 83702 (208) 334-2148

Members
Harold Bell
Lester Clemm
Ervin Gilbert
Lowell Grim
Eugene Thomas
Administrator
Wayne Faude

July 9, 1985

Oregon - Washington State Director
Bureau of Land Management (935)
P.O. Box 2965
Portland, Oregon 97208

Weeds are continuing their march through Idaho by skirting agricultural valley floors, where private landowners try to control their numbers, and racing unabated in the surrounding foothills and mountains managed by the federal government.

12-1 The heads of watersheds and river basins are almost always under government jurisdiction. When these are inhabited by noxious weeds they serve as a haven from which the fertile valleys are repeatedly invaded. If the water from such an area flows into an irrigation system the dispersal of these weeds throughout our prime agricultural land is accelerated.

Rangelands are steadily deteriorating to the detriment of livestock and wildlife alike. Cheatgrass, an undesirable weed itself would be a welcome return to rangelands [illegible] it could replace the medusahead and skeletonweed. At least cattle and big game would have some spring and fall grazing and chukar partridge would have an abundance of winter food. The sharp-tailed grouse has already lost parts of its reduced range due to changes in plant species composition within its habitat.

Current economic studies indicate that noxious weeds are costing Idahoans $500,000,000 annually or about $530 per person. Weed control program coordinators for private lands have estimated a setback of five years due to the lack of a weed control program on federally controlled lands.

Our staff reviewed the May 1985 "Northwest Area No[illegible] Weed Control Program Environmental Impact Statement" published by the U.S.D.I. BLM and did not find the slightest reason for further delaying the proposed action of alternative 1 based on the current scientific knowledge of 2,4-D and picloram. Further scientific study of these herbicides before taking positive action would result in delay of a comprehensive noxious weed program and would be too costly to the people of Idaho.

Wayne R. Faude

Wayne R. Faude
Administrator

Idaho Department of Lands

RESPONSE TO COMMENT LETTER 12

12-1 BLM recognizes that water systems serve as vectors in weed dispersal. Because of this, such areas will be high on the priority list for treatment.

13

STATE OF IDAHO
DEPARTMENT OF AGRICULTURE

JOHN V. EVANS
Governor
RICHARD R. RUSH
Director
2270 OLD PENITENTIARY ROAD
P.O. BOX 790
BOISE, IDAHO 83712
(208) 334-3240

July 5, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Leavell:

I have studied the EIS draft for the Northwest Area Noxious Weed Control Program and would like to offer the following comments:

Noxious weeds infesting public land within the state need to be controlled to comply with State and Federal statutes. An extreme emergency now exists and immediate attention is necessary to prevent additional economic burdens on the state, federal, county and private lands located within this jurisdiction due to the spread of noxious weeds from public lands into surrounding areas.

Weeds are extremely expensive to the State of Idaho. A recent University of Idaho study indicates that weeds cost Idaho over $500 million annually due to cost of controlling weeds, loss of cropland, grazing land and recreational sites. The private sector, Idaho counties, various state agencies and the U.S. Forest Service are spending millions of dollars to combat the noxious weed problem in this state. An effort by all agencies is needed to stop the spread of this devastating problem.

Of the alternatives offered in the draft statement, Alternative 1 which includes helicopter and ground application of herbicides is the best choice. Manual, mechanical, and biological methods are also included in this alternative. Manual and mechanical means are very time consuming and expensive. Biological methods are a worthy goal; however, this approach is limited by environmental variables. Time is of the essence and proven methods of chemical weed control need to be utilized. Alternatives 2 and 3 are more restrictive and due to the severity of the problem would be impractical. Alternative 4 will only compound the extremely critical situation.

Therefore, the State of Idaho is prepared to endorse Alternative 1 and urges endorsement by all agencies involved in this crisis situation.

Sincerely,

Lawrence Knigge
Lawrence Knigge
Idaho Weed Control Coordinator

LK:Pao

EQUAL OPPORTUNITY EMPLOYER

14

IDAHO
FARM
BUREAU

Oscar Field - President
Thomas Geary - Vice President
Lynn Parks - Executive Vice President

IDAHO FARM BUREAU FEDERATION
P.O. [illegible] - [illegible] WEST CENTER
POCATELLO, IDAHO [illegible]
[illegible]

July 17, 1985

COMMENTS ON NORTHWEST AREA
NOXIOUS WEED CONTROL PROGRAM

ENVIRONMENTAL IMPACT STATEMENT
DRAFT PROPOSAL

Idaho Farm Bureau is extremely concerned about the shameful spread of noxious weeds on all lands in Idaho especially BLM. Farm Bureau was very active in supporting legislation to create and fund the position of a statewide weed coordinator in the 1985 legislature.

The Idaho Legislature originally approved the Noxious Weed Act in 1970 which provides that noxious weeds shall be controlled on all lands regardless of ownership. University of Idaho Research Weed Specialists calculate the combined annual cost of noxious weeds in Idaho exceeds $500 million. This relates to nearly $500 annual cost for every man, woman, and child in our state.

The Draft EIS statement appears to be more than adequate and should satisfy anyone's concern. The thoroughness of the document reflects a tremendous expenditure of agency time, effort, and expense to the taxpayers. It seems totally unreasonable that the research done on this draft EIS and Worst Case Analysis be nearly a duplication of the work done by EPA before approval was granted for the use of these chemicals under similar circumstances.

Idaho Farm Bureau strongly supports Alternative #1. The other alternatives would be a licence for noxious weeds to completely blanket the lands in our state. The seriousness of the noxious weed problem is so severe that every possible method of control should be used in the program. Along with the program, every effort should be made to develop natural means of control such as parasites, insects, etc., that would help to eliminate our noxious weed problem and reduce the costly use of herbicides.

It is unforgivable that BLM's efforts to control noxious weeds have been legally blocked for two years while noxious weeds have been allowed to spread. It is imperative that a vigorous BLM Noxious Weed Control Program be resumed immediately. This effort must be in cooperation with all other landowners and agencies under the coordination of the Idaho Noxious Weed Coordinator.

Respectfully submitted

Dave Bivens
Dave Bivens
Acting Director Public Affairs

BRANCH OFFICE [illegible] WASHINGTON STREET • P O BOX [illegible] • BOISE, IDAHO [illegible] • [illegible]

15

DEPARTMENT OF STATE LANDS

TED SCHWINDEN, GOVERNOR
STATE OF MONTANA
(406) 444-2074
1625 ELEVENTH AVENUE
HELENA, MONTANA 59620

July 18, 1985

Oregon State Director
Bureau of Land Management
% R. Gregg Simmons
P.O. Box 12965
Portland, OR 97208

Re: Noxious Weed Control Program Draft EIS

Dear Mr. Simmons:

The Department has reviewed the draft environmental impact statement for the Northwest Area Noxious Weed Control Program and have the following comments.

15-1 Page 2, paragraph 1 - In view of the proposed weed treatments of the preferred alternative, it is unlikely that eradication of noxious weed species can be achieved. Perhaps the statement should be changed to reflect that only control of noxious weed species is proposed.

15-2 Chapter 3, Environmental Consequences - The potential for herbicide residue buildup (particularly with picloram) following repeated applications and the expected impacts on the environment should be addressed. This may be more of a potential problem in arid and semiarid areas where residue buildup following repeated applications exceed the rate of dissipation.

Thank you for allowing us to comment on the Draft EIS. If you should have any questions or require further input or clarification, please contact the Department.

Sincerely,

Terry Conway
Terry Conway
Range Scientist
Coal & Uranium Bureau
Reclamation Division

tm
FC: 621.1

RESPONSE TO COMMENT: LETTER 15

15-1 The eradication of most noxious weed species from public land would be extremely difficult to achieve. Although eradication is a worthy goal, control will probably be a more realistic achievement.

15-2 The Soils Impact section of Chapter 3 has been revised to further address the potential for picloram residue buildup. Also see responses to comments 31-10 and 43-46.

16

27655 Frontage Road
Bozeman, MT 59715
July 18, 1985

Mr. R. Gregg Simmons
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

I have reviewed the Environmental Impact Statement covering BLM's plans for control of noxious weeds in the five northwest states.

Most of the proposed action (Alternative 1) seems reasonable to me, as long as precautions are used to minimize adverse effects. I can agree with the use of chemicals, biological, and manual methods, but I am not convinced that burning is a satisfactory way of controlling weeds. Soil erosion might be a factor if burning is used too extensively, or if a burn should get out of control, and we already have too much soil loss from timber and grazing lands managed by both BLM and Forest Service.

16-1 Spraying with chemicals around riparian areas should be done with great caution. Water quality and fish habitat should receive the highest priority in riparian areas, and spray operators should be instructed to avoid such areas. Manual control would be advisable near all streams.

I note that BLM plans to cooperate with other agencies as well as landowners and this is commendable. However, cooperation with Montana's county weed boards will mean taking the lead, because most of them do a lousy job of directing any kind of a weed control program.

If spray programs are run by experienced operators, who can read and follow directions, and who will spray only target plants, then society should be well protected. However, if large areas of non-target plants are damaged in the process of getting at a few undesirable plants, then BLM will deserve the criticism that follows.

I appreciate the opportunity to comment. Good luck!

Sincerely yours,

Harry McNeal

Harry McNeal

RESPONSE TO COMMENT LETTER 16

16-1 Caution must be used when treating areas around surface water and riparian areas. As addressed several places in the EIS, application methods become more restrictive and impact analysis more critical the closer to water. For example, wind speeds cannot exceed certain levels, hand guns and booms would not be allowed in some riparian areas, and use of broadcast spreaders would not be allowed within 10 feet of the high water line of streams and other water bodies. Also, as directed on the Tordon 2K pellets label, where a sandy porous soil overlies ground water closer than 10 feet below the surface, the herbicide would not be used. As you suggested, high priority will be given to protecting water quality and fish. More specific application methods will be recommended in the site-specific environmental analysis that will be conducted for each area before treatment. For example, in some areas reduced herbicide application rates would be appropriate, which could require several repetitions of the treatment.

17

United States Department of the Interior

BUREAU OF RECLAMATION
[illegible]

PN 150
406.

JUL 17

Memorandum

To: State Director, Bureau of Land Management, Portland, Oregon

From: Assistant Regional Director, Bureau of Reclamation, Boise, Idaho

Subject: Review of Draft Environmental Impact Statement (EIS)--Northwest Area Noxious Weed Control Program, Bureau of Land Management (DES 85/30)

The subject draft EIS has been reviewed by appropriate members of the Bureau of Reclamation staff in the Pacific Northwest Region. Our letter also includes comments provided by the Bureau's Upper Missouri Region headquartered in Billings, Montana.

General:

We find the program to be well conceived in choice of herbicides and adequately researched to provide safe and prudent use. It should serve to insure proper use and minimal effect on the total environment in the areas to be treated.

The program will benefit the Bureau of Reclamation wherever it administers United States land contiguous to Bureau of Land Management tracts through control and reduction of spread of noxious weeds. It will result also in benefits to Reclamation affiliated water-user organizations through watershed improvement and control of plant species detrimental in irrigation system operation and maintenance and agricultural lands.

Specific:

Pages 4 and 5, 74 and 75.--It would be helpful if these maps contained reference points in addition to the cities. River locations would ue beneficial, for example, in identifying areas of concern.

17-1 Page 11, third paragraph, Biological Methods.--Additional information on biological control methods might be obtained from the Montana State University Plant Science Department, Bozeman, Montana.

17-2 Page 40, Impacts on Threatened and Endangered Plants.--A listing and location map for threatened and endangered plants would be helpful to the reviewer. Information on these plants in Appendix E (page 79) would aid understanding of herbicide effects.

Thank you for the opportunity to review this document. Please let us know if we can be of further assistance.

cc: Regional Director, Bureau of Reclamation, Billings, MT, Attention: 150
Commissioner, Washington, D.C., Attention: 150

RESPONSE TO COMMENT LETTER 17

17-1 In most circumstances, the biological control agents tried are not achieving control. They may be creating stress, which is not the same as control. Biological control is addressed in the response to common issue 8. Information on biological control methods and agents has been obtained from Montana State University; USDA, Agricultural Research Service, Range and Insect Laboratory, Bozeman, Montana; and Dr. Peter Harris, Biological Agriculture Canada Research Station, Box 440, Regina, Saskatchewan, Canada.

17-2 No federally listed threatened plants but three federally listed endangered plant species are reported to occur in the EIS area. The locations of these endangered plant species may be obtained from respective BLM state and district offices. Appropriate measures will be taken to protect these species from any action that would contribute to their extinction. See page 24 of DEIS.

18

Cooperative Extension Service
MONTANA STATE UNIVERSITY, U.S. DEPARTMENT OF AGRICULTURE AND MONTANA COUNTIES COOPERATING
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717

July 18, 198

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

The purpose of this letter is to comment on the Draft Environmental Impact Statement (EIS)for noxious weed control in five northwestern states. First, I feel that the individuals who prepared the document should be commended. They have prepared an EIS that adequately describes and analyzes the environmental impacts of the various alternatives. More importantly, because the weed problem is extremely serious, I recommend that the "proposed" program for controlling noxious weeds be implemented.

As the Extension Range Management Specialist in Montana, I have had the opportunity to work with BLM employees on many occasions. The individuals that are involved with weeds are extremely cooperative. I know of no instance where they have not coordinated their efforts with the state, counties, and private landowners. As a group they understand the impact of chemical, biological, manual and mechanical methods of control.

The EIS adequately describes the purpose of and need for action. The fourteen noxious weeds are serious problems on rangeland. Although no one knows exactly how many acres are infested, the figures presented in Table 1-1 appear to be realistic. Likewise, the proposed herbicide treatments (pages 8-9) are technically sound.

18-1 I am concerned about the number of acres that are proposed for treatment. The proposed action only involves about 25,000 acres for treatment. However, on page 21, it is reported that an average of 172,717 weed-infested acres were treated annually in 1982 and 1983. This suggests to me, that the BLM is actively restricting its weed control activities. This strategy is disturbing because the weeds are continuing to spread at a rapid rate. Thus, more acreage needs to be treated! EIS should explain the impact of treating different acreages of noxious weeds annually (i.e., 25,000 versus 172,000).

The conclusion in Chapter 3, that "the most effective and efficient control of noxious weeds would be provided by Alternative 1" is entirely correct. I also agree with the lists that classify plants as noxious, noxious and troublesome, and poisonous (pages 70-71). However, on page 70, the common

18-2 name of Isatis tinctoria should be dyers woad not dyers wool. Although I

The programs of the Montana Cooperative Extension Service are available to all people regardless of race, creed, color, sex or national origin

R. Gregg Simmons
July 18, 1985

Page 2

did not check the accuracy of Appendix E (Susceptibility of common weeds to herbicides), I feel that spotted and diffuse knapweed should be described as perennials, not biannuals. This table would also be more useful if it contained each of the plants listed on pages 70-71. The control ratings for the herbicides (E,G,F or P) should also differentiate between the residual affect of a herbicide. It is misleading to state that a certain

18-3 "percent of the weed population is killed by a single treatment". Instead, it should consider the fact that individual plants may be killed, but a specific herbicide may or may not have to be applied annually to prevent seeds from germinating and new plants establishing.

In summary, the EIS is well written. I strongly recommend that the proposed action be implemented over the other alternatives. However, I am concerned that the annual treatment of 25,000 acres may be inadequate.

I appreciated the opportunity to comment on your EIS. Please contact me if I can be of further assistance.

Sincerely,

John R Lacey

Dr. John R. Lacey
Extension Range Management Specialist
221 Linfield Hall
406-994-5601

elj

RESPONSE TO COMMENT LETTER 18

18-1 The figure referred to on page 21 of the DEIS (172,717 acres) is incorrect. BLM regrets an error of such magnitude. In verifying the figure, it was found that in 1982 and 1983, an average of 6,077 acres were treated with herbicides in the EIS area. In addition, biological control agents were used to treat 11,000 acres in 1982 and 27,000 acres in 1983, mostly for tansy ragwort control in Oregon. The change has been made.

18-2 The spelling of Dyers woad has been corrected.

18-3 See revised Appendix E concerning spotted and diffuse knapweed. The growth habits depend on several factors such as the plant's genotype and climatic conditions, and whether they are annuals, biennials, or perennials. Revised Appendix E clarifies herbicides and treatment numbers.

19

Department of Natural Resources
OLYMPIA, WASHINGTON
98504

BRIAN BOYLE
Commissioner of Public Lands

July 17, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Greg Simmons
P.O. Box 2965
Portland, OR 97208

Gentlemen:

The Department of Natural Resources has reviewed your Draft Environmental Impact Statement for noxious weed control in five northwestern states (Idaho, Montana, Oregon, Washington and Wyoming).

The document appears to adequately address the impacts and provide alternatives. Thank you for the opportunity to review.

Sincerely,

Kenneth Solt

Kenneth Solt, Manager
Lands Division

KS:pd56

Equal Opportunity/Affirmative Action Employer

RESPONSE TO COMMENT LETTER 20

20-1 See response to comments 43-47 (paragraphs 2 and 3), 6-1 and 6-2, and common issue 7 for clarification of an area's predisposition for weed infestation.

20-2 Stands and production of native grasses increase after weed-infested areas are treated (at recommended label rates or reduced rates) with such herbicides as 2,4-D, dicamba, and picloram. An example of increased forage production after herbicide treatment was reported by Tumm (1982), where 3-year average forage production ranged from 741 air dry pounds of forage/acre after treatment of 0.5 pounds active ingredient/acre of picloram and 1 pound active ingredient/acre of 2,4-D to 1,313 pounds air dry forage/acre after treatment of 2 pounds active ingredient/acre of picloram and 1 pound active ingredient/acre of 2,4-D. The control or untreated area produced 451 pounds air dry forage per acre. Areas treated with glyphosate would be reseeded where warranted.

20-3 Measures will be taken to prevent damage to riparian vegetation. See response to comment 16-1. Also see buffer strip design features in Appendix I.

20-4 The BLM Manual section 9222.14F requires the development of a spill contingency plan as a standard procedure prior to implementing the program. Due to the many factors that may influence spill contingency plans, they are best addressed during site-specific analysis and documentation. General guidelines for spill contingency plans are presented in BLM Manual 9222 Appendix 2.

20

14245 SW Walker #84
Beaverton, Oregon 97006
July 18, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

I recently had the opportunity to review for the Portland District, USACE, your Northwest Area Noxious Weed Control Program-Draft EIS. My comments on activities in the EIS relating to the Corps'areas of authority have been forwarded to our District Office to be incorporated into an official position statement. I have some additional points unrelated to Corps'activities which I wish to personally comment on and bring to your attention.

20-1 1. A discussion of conditions which predispose an area to infestation by noxious weeds (e.g. overgrazed range, wildfire) should be included, even if this topic was previously presented in grazing management plans or other EISs, since eliminating or managing these contributing factors will be essential in controlling noxious weeds.

20-2 2. A discussion of follow-up seeding programs should be included since some infested areas may not have the capacity to quickly re-establish native vegetation once noxious weeds have been controlled.

20-3 3. P. 44 Impacts on Fish. Fish populations could be adversely affected by loss of riparian vegetation from drift of herbicide. Riparian vegetation helps to keep water temperatures cool, and may provide habitat for certain life stages of aquatic insects.

20-4 4. P. 101 Pretreatment Surveys. Preparation of a contingency plan for managing spills of herbicide into bodies of water should be a pretreatment activity.

Sincerely,

Thomas Haensly

Thomas Haensly
Wildlife Biologist

21

WOOD RIVER
RESOURCE CONSERVATION and DEVELOPMENT AREA
BLAINE-CAMAS-GOODING-LINCOLN Counties, Idaho

131 3rd Avenue East
Gooding, Idaho 83330
(208) 934-4149

July 19, 1985

COMMENTS OF THE WOOD RIVER RESOURCE AREA ON THE NORTHWEST AREA NOXIOUS WEED CONTROL ENVIRONMENTAL IMPACT STATEMENT

The Wood River Resource Area believes the EIS is a sound document. The appendices are well put together and give a good analysis of the risk involved from using herbicides for weed control.

As shown in the EIS, using herbicides for noxious weed control is a safe and sound resource management practice. For this reason, the WRRA strongly supports Alternative 1 being selected for treating noxious weeds on lands administered by the BLM.

Since the need to control noxious weeds is so critical and the risks to public health so slight, we feel it is crucial that weed control be allowed while this EIS is undergoing comments and reviews. This will help to prevent further deterioration of the public lands and minimize the loss of prior years' investments in weed control.

Some items we believe should be added in the final EIS to make it more accurate are:

21-1 1. The contamination of noxious weed seeds in water flowing from public lands is not mentioned as a problem. We believe the hazards to public health from the spread of poisonous plants and economic loss to society many more times as serious as that from herbicide residue.

2. Under Economic Conditions in the summary, it is stated that Alternatives 3 and 4 could potentially cause economic losses in the area. The selection of either of these alternatives would definitely cause economic losses to the area from several aspects.

21-2 3. Table 1-1, page 2 states there are 59,440 acres of BLM administered lands in Idaho affected by noxious weeds. We commented that this figure was extremely low when it was used in the Environmental Assessment issued in January and are disappointed that it has not been updated. We don't have an accurate acreage for the entire state, but in the WRRA alone, there are at least 332,454 acres infested with noxious weeds.

21-3 4. The threat to native plants, particularly rare and endangered ones, from competing noxious weeds is not brought out strongly enough in the EIS.

21-4 5. On Page 11 under Mechanical Methods for Weed Control, it states tilling on slopes less than 10 percent might be used as a control measure. When slopes over 4 percent are tilled and residues are not left on the soil surface, large amounts of erosion occur. The severity of this increases with the length and steepness of slope.

21-5 6. As noxious weeds are controlled on poor condition rangeland, it is important that rehabilitation measures are implemented to discourage reinfestation of weeds. This is not addressed in the EIS and should be.

7. The herbicides Glyphosate and Decamba are not being questioned as having possible carcinogenicity potential. Since there is no hazard from using these, we feel while 2,4-D and Picloram are being analyzed, we should at least be allowed to use Glyphosate and Decamba.

Everett "Buck" Ward

Everett "Buck" Ward
Council Chairman

RESPONSE TO COMMENT LETTER 21

21-1 Water flowing across public land can serve as a vector in spreading noxious weed seeds. Also see common issue 7 and response 12-1.

21-2 The noxious weed infested acreage used in this EIS was provided by BLM district offices with some help from county weed control officials. Your figure of 332,454 acres within the Wood River Resource Area may be appropriate for all land, but our EIS figure for Idaho (59,440 acres) includes only public land administered by BLM. The figures were again checked with Shoshone district and were accurate based on their information.

21-3 Many noxious weeds out-compete native plants for moisture and nutrients. Noxious weeds such as knapweed (Cranston 1980); Canada thistle, field bindweed, and leafy spurge (Klingman and others 1982); and yellow starthistle (Callihan and others 1984) have alleopathic effects on other plants. Also see response 17-2.

21-4 BLM recognizes that one of the consequences of tilling on steeper slopes is the increased potential for erosion. It is also recognized that the potential of a site for erosion depends not only on the slope but also on the physical characteristics of the soil. The statement on page 11 of the DEIS is intended to mean that tilling will only be considered on slopes less than 10 percent and that slopes greater than 10 percent will not be considered for tilling. Each site will be evaluated on a project-specific basis for its erosion potential before any action takes place.

21-5 See response to comments 6-1 and 20-2 for a discussion of poor condition rangeland and rehabilitation.

22

George Wooten
Box 246
Malott, WA 98829

R. Gregg Simmons
EIS Team Leader
BLM Oregon St Office
POB 2965
Portland, OR 97208

Dear Sirs:

I am a member of the Washington Native Plant Society and am very interested in obtaining a copy of the EIS concerning the control of noxious weeds in Washington, Oregon, Idaho, Montana, and Wyoming. If possible could you send a copy to the address below.

Also I would like to enter the following public comments pertaining to the issue to be entered before July 31:

- As presently conducted by our County Noxious Weed Control Board (WCB), the methods for weed eradication used for our local problems are not economically feasible: i.e., hand pulling of weeds such as knapweed is too expensive and inneffecient; spraying with herbicides causes too many health and environmental side effects.

- Local weed boards such as those administered by county organizations are inexperienced in the botanical backgtound necessary for sound weed management; the boards are often poorly organized and the members inept and indiscreet in their dealings with property owners.

- State and Federal land~~s~~ adjacent to private land owners is subject to different weed control methods. The unfairness of these practices is unreasonable for it is the private landowner most desperate of help.

- Alternate programs of weed control are not presented by the WCB and education of the concerned public by our own, local Okanogan County WCB is nil.

- It should be the responsibility of the government to support the efforts of land restoration directly, rather than relying on the levying of inflated fines and property liens to advance the pet programs of our vociferous leaders.

Thank you very much for your consideration.

Sincerely,

George Wooten

23

COOS-CURRY COUNCIL OF GOVERNMENTS
170 S. SECOND STREET, SUITE 204
COOS BAY, OREGON 97420
267-6500

RAY KELLEY, Chairman
TIMM SLATER, Vice-Chairman
JOE JAKOVAC, Treasurer
SANDRA DIEDRICH, Director

July 15, 1985

Daniel Bowman
USDI, Bureau of Land
Management
Oregon State Office
P.O. Box 2965
Portland, OR 97208

Re: USDI Bureau of Land Management
BLM's Draft Environmental Impact Statement for Noxious Weed Control in the five Northwest States

Dear Mr. Bowman:

As part of Oregon's Intergovernmental Project Review, in compliance with Executive Order #12372, the Coos-Curry Council of Governments on July 11, 1985, reviewed a Draft Environmental Impact Statement for BLM's Draft Environmental Impact Statement for Noxious Weed Control in the five Northwest States from the USDI, Bureau of Land Management.

As a part of its review, the Council acted on the enclosed staff report which is incorporated as part of the review comments.

The review action of the Council was a favorable review.

Should you have any questions regarding this action by the Council, please do not hesitate to contact us.

Sincerely,

Sandy

Sandra Diedrich
Director

SD/ab

Enclosure

cc: State Clearinghouse

REPRESENTING MEMBERSHIP OF GENERAL PURPOSE AND
SPECIAL PURPOSE UNITS OF GOVERNMENT IN COOS AND CURRY COUNTIES

INTERGOVERNMENTAL PROJECT REVIEWS

Summary of Review and Comment Activity

The following notifications will be reviewed and acted upon at the July 11, 1985 meeting. To assist the Council, a summary of review and comments is provided. If additional issues can be identified, please contact the Coos-Curry Council of Governments' staff so that information on the issues can be gathered before the meeting.

.2 PROJECT: BLM's Draft Environmental Impact Statement for Noxious Weed Control in the five Northwest States.

PROJECT DESCRIPTION: The EIS states in its abstract that noxious "weeds are reducing public rangeland productivity, spreading to nearby noninfested lands, and increasing the economic burden on private landowners and state and federal taxpayers. The alternatives analyzed include (1) the Proposed Action, (2) No Aerial Herbicide Application, (3) No Herbicide Use, and (4) No Action."

COMMENTS REQUESTED: Coos County Extension Office

COMMENTS RECEIVED: Lynn Cannon, OSU Extension Agent

1 Because of the topography and inaccessibility of these areas, aerial spraying is the only effective means of applying herbicides. To rule out aerial spraying is the same as ruling out the use of herbicides. This is not to say that herbicide use is the only tool for noxious weed control; however, it is an important and necessary tool that must remain available for use.

Noxious weed controllers must consider an intergrated program including mechanical, biological, chemical and management techniques. Each site should then be evaluated as to the safety and effectiveness of each of the four techniques. The guiding philosophy should be neither to advocate solely one method for weed control nor to preclude any particular method.

STAFF COMMENTS: The EIS does a good job of describing the various noxious weeds and their spread over the Pacific Northwest during the past sixty years. Lynn Cannon's comments are clear and direct, and no doubt reflect the opinions of most local farmers and ranchers.

RECOMMENDED ACTION: Favorable review

RESPONSE TO COMMENT LETTER 23

23-1 **See response to comment 10-2.**

5:2

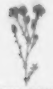
24

Valley County Weed Control
P.O. Box 1167 – Glasgow, Montana 59230

Office (406) 228-2457
Shop 228-8306

NOXIOUS WEEDS
WANTED: DEAD!

CANADA THISTLE


RUSSIAN KNAPWEED

FIELD BINDWEED

LEAFY SPURGE

WHITETOP

July 15, 1985

Valley County Weed Control would like to go on record as being in favor of alternative number one, the proposed action. I would believe that with modern technology everyone will benefit most with the proposed action. In order to make and progress in battle against weeds we need all the weapons available and all the cooperation we can get among all levels of Government.

Valley County
Weed Supervisor
Rick Stellflug

25

PRAIRIE COUNTY WEED BOARD
P. O. Box 7
☆
Terry, Montana 59349

July 26, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sirs,

The Prairie County Weed Board endorses and supports Alternative 1 in the Northwest Area Noxious Weed Control Program Environmental Impact Statement.

It is imperative that all landowners, including the United States Government, take an active role in stemming the tide of noxious weeds in Southeastern Montana and the Northwest Area.

Thank you for your consideration in this matter.

Sincerely Concerned,

James H. Lindstrom
Prairie County Weed Board Secretary

JHL/cn

26

WyFB
WYOMING FARM BUREAU

July 22, 1986

Northwest Area Noxious Weed Control Program EIS.

Wyoming Farm Bureau Federation Comments.

We appreciate the opportunity to comment on the EIS and have the following observations to make concerning it. All comments pertain to Wyoming.

WyFB policy concerning noxious weed control is as follows:

> We feel the fight against noxious weeds is a common one, necessary and beneficial to all segments of our economy. We urge greater cooperation and effort on the part of all persons and agencies concerned with the efficiency and expansion of weed and pest programs.

We feel that Alternative One (Proposed Action) comes the closest to complying with this policy.

There are some areas of the EIS which need to be adnressed.

Page 7 Weed Management Treatments and Design Features. This section describes the process which the BLM will go through for treatment of weeds. It appears to be quite cumbersome and needs to have some streamlining done to it so if an area of noxious weeds is in a critical stage of development the control program can be affected in time to do some good. A patch of Canada thistle will not wait for all of the surveys to be completed before going to seed. The trend for treatment of weeds on Wilderness Study Areas is disturbing in as much as the weeds will only be controled in "small areas". This will not be very effective in control of weeds and if the maps in appendix D are correct more areas need treatment and control measures, not less. Wyoming law requires that weeds and pests be controlled. Landowners are required to control weeds and pests.

26-1 In Wyoming many of the weed problems are greatest around stream banks and reservoirs. Most of the weeds around streams and reservoirs would fall within the buffer zones established for water sources. While there is no mention of the width of "buffer strips" (Appendix I, Pg. 101) there should be provisions for weed control in these buffer strips. Experience has shown that weeds established close to a live stream or lake will continue to be a source of reinfestation and spread year after year unless adequate control measures are taken.

Also provisions for a 500 foot unsprayed buffer strip to be left next to inhabited dwellings unless waived in writing by the resident for aerial applications is to cumbersome. This requirement would not be necessary in the case of granular application. A more effective way would be for the local resident to notify the proper people if they wish a 500 foot strip to be left rather than the other way around. The owner should be contacted not only the inhabitants of a dwelling.

P.O. Box 1348 Laramie, Wyoming 82070 Phone (307) 745-4835

In Wyoming, areas to be sprayed by aerial application are generally widely advertised and anyone wishing to do so could request a 500 foot buffer strip. This would be more cost effective than the proposed system.

Of the two areas of concern the comments on the Wilderness Study Areas are of the greatest importance to our members. A Wilderness Study Area could become synonymous with a weed sanctuary if not handled properly.

Again we appreciate the opportunity to comment on this EIS.

RESPONSE TO COMMENT LETTER 26

26-1 Streams do spread noxious weed seeds. Therefore, noxious weeds would be controlled in buffer zones around streams and reservoirs, but using methods that will not significantly impact the aquatic resource. Such methods may include hand wiping application of herbicides, hoeing, hand pulling, mowing, etc.

27

COOPERATIVE EXTENSION SERVICE
University of Idaho
College of Agriculture
in Cooperation with the
U.S. Department of Agriculture

Fremont County Courthouse
P.O. Box 328
St. Anthony, Idaho 83445
Phone (208) 624-3102

July 26, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P. O. Box 2965
Portland, OR 97208

Dear Mr. Simmons:

This letter is in response to the Environmental Impact Statement written by the BLM for the Northwest Area Noxious Weed Control Program. Both the Fremont County Weed Supervisor and Extension Agricultural Agent reviewed this document and have these comments.

Alternative 1: The proposed action agrees most closely with our philosophies and practice of weed control. I feel confident that these sentiments are shared by our County Weed Advisory Board, County Commissioners and stockmen.

Recently a farmer complained to me about Meadow Salsify taking over a portion of his BLM pasture allotment. Do provisions exist for control of non target noxious weed? 27-1 Can stockmen arrange cost-shared weed control on BLM ground without involving the county weed crew in the State of Idaho?

I hope flexibility in management of weed control on BLM ground is provided where not stated in this EIS.

Sincerely,

Tim Herrman

Tim Herrman
Extension Agricultural Agent

TH:vc

The University of Idaho is an Equal Opportunity/Affirmative Action Employer

RESPONSE TO COMMENT LETTER 27

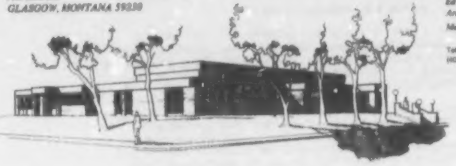
27-1 The cost sharing of weed control on BLM-administered lands between the allotment holder and BLM can be considered under the range improvement program.

28

Valley County Board of County Commissioners
P.O. BOX 311
GLASGOW, MONTANA 59230

Howard "Tiny" Cornwell, Chairman
Edwin V. Swenson
Ardan B. Nichols
Mary Lou Eide, Clerk

Telephone
(406) 228-1713



July 26, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

The Board of County Commissioners have reviewed the Northwest Area Noxious Weed Control Program - Environmental Impact Statement and we feel Alternative #1 would be the best alternative.

It is our opinion the control of noxious weeds is a very important issue and the Bureau of Land Management should strive to control noxious weeds on their lands.

We respectfully request your consideration on this decision.

Very truly yours,

Howard Cornwell

Howard Cornwell, Chairman
Board of County Commissioners

HC/mle/dw

29

TSWCC

TRI-STATE
WEED COORDINATING COMMITTEE

July 25, 1985

Oregon State Director
Bureau of Land Management
% Gregg Simmons
P. O. Box 2965
Portland, OR 97208

Dear Sir:

The Tri-State Weed Coordinating Committee (TSWCC) believes the Northwest Area Noxious Weed Control Environmental Impact Statement is a sound document and is well put-together. It certainly reinforces the concerns we have as an organization concerning noxious weed controls.

Our experience has been that herbicides properly used is a safe and sound resource management practice. This is reconfirmed in this EIS. For this reason, we of the TSWCC strongly endorse Alternative I being selected for treating of noxious weeds on lands administered by the BLM.

As we have reviewed this EIS, we have some additional concerns. They are:

29-1 1. The EIS states there are 59,440 acres of BLM administered lands in Idaho affected by noxious weeds. We feel this figure is extremely low. From the experiences of weed supervisors in our organizations, we feel this figure is not high enough to include the area of Idaho included in the TSWCC.

2. As we review the appendices and reaffirm our concern for the spread of the many noxious weeds, we feel the costs of weed control must be borne now, not rely on nature to take its course as the other alternatives suggest. The costs in the future, even to maintain the productivity of other lands, will be much more costly if Alternative I is not adopted.

3. The appendices indicate how much the noxious weeds have spread in the recent past. We find in the last five years many of these same weeds are spreading much more rapidly than previously and into areas where cultivation or hand pulling cannot keep up with it. The weeds are almost at an epidemic stage.

July 25, 1985
page 2

29-2 4. The EIS does not adequately address the amount of wildlife habitat affected by noxious weeds. Also, access to fishing and hunting has been drastically reduced due to the presence of certain noxious weeds. Especially is this true of fishing habitat and access to fishing streams and reservoirs rendered inaccessible due to noxious weed "barriers". In addition, these same streams spread these noxious weed seeds on down the system to further contaminate and reduce habitat and access.

29-3 5. We have found that from where noxious weeds start, often the weed seed must be spread by recreationists. We feel the BLM and others must look at this cause of infestation, also.

6. The alternative of tillage, hand rogueing and no action cannot be acceptable from an erosion hazard standpoint. The proper tillage can eliminate some weeds, and repeated tillage over enough years can eliminate the seeds already in the soil awaiting germination. However, this leaves the soil exposed and subject to erosion. No action is not acceptable either because most noxious weeds give off substances which retard other vegetation or their rooting system is such that they take the available water supply away from other vegetation which will hold the soil in place and noxious weeds are not good for soil erosion control.

29-4 Tillage, hand rogueing, etc. without revegetation is not acceptable on slopes over 10 percent as stated on Page 11, but it is not acceptable for under 10 percent either. Without adequate vegetative protection, bare soil on near flat slopes is very erosive.

Soils without vegetation, whether caused by tillage or abandonment will become reinfested by weeds, ofttimes noxious weeds, so we feel this practice alone is not acceptable.

May we thank you for the opportunity to comment on this document and we encourage you to move ahead with an adequate noxious weed control program.

Sincerely,

Donald L. Rex

Don Rex
Chairman

RESPONSE TO COMMENT LETTER 29

29-1 The BLM acreage affected by noxious weeds used in this EIS was provided by BLM district offices with some help from county weed control officials. Although these figures may not be exact, they were our best estimate when this EIS was prepared.

29-2 It is difficult to address the total amount of wildlife habitat affected by noxious weeds in a five-state area in a single document. Noxious weed treatment could affect both target and nontarget vegetation, depending upon the method of control and nontarget species present. The EIS stated that reduced herbicide rates would be used in riparian areas. By following guidelines stated in the EIS, herbicide label recommendations, and recommendations of university researchers, injury to nontarget species would be minimized. Site-specific analyses and appropriate documentation will address the impacts of vegetation in greater detail. Also see common issue 7 and response to comment 36-1 for control of weeds in stream and reservoir buffer zones.

29-3 See response to common issue 7.

29-4 See response to comments 21-4 and 6-1.

30

COMMENTS ON ENVIRONMENTAL IMPACT STATEMENT

NORTHWEST AREA NOXIOUS WEED PROGRAM

ALTERNATIVE #1

Alternatives to herbicide treatment listed i.e., biological or cultural will result in reduction and control of some weed species but are not the most economical methods. The only biological control agent in use in Bonneville county is the Rhynocyllus conicus on musk thistles. The insect is undoubtedly of value in reducing seed production of musk thistles. Observation of numerous musk thistle plants infested with Rhynocyllus conicus, the upper or terminal seed heads are 90% affected while the lower seed heads are usually left untouched. Several biologists have pointed out the fact that thistle plants have the capability of producing numerous buds that will bloom after the beetle larvae have reached the pupation stage when the upper buds are under stress for various reasons. This results in a situation where the reduction of seed production is minimal.

Leafy spurge - Hawkmoth - Infestations of the Hawkmoth on leafy spurge was observed in Bozeman, Montana on July 18, 1985. Hawkmoth feeds on leafy spurge blossoms and will reduce seed production. Does not kill the plant itself.

Diffuse and spotted knapweed - observed two gall flies - Urophora affinis and urophora quadrifasciata on diffuse and spotted knapweed on July 22, 1985.
Infested seed heads estimated at 10-20% of heads per plant.
Original release site near Fairfield shows no reduction of knapweeds.

Cultivation, tillage, hand pulling

Simple perennials may be eradicated if plowed each year from 2-3 years in succession, Leafy spurge, dyers wood, spotted knapweed are some of the species. Plowing must be done with muld board plow. Disk plows are not very effective. The above three species are not a problem on land rotated to row crops or crops requiring cultivation. Merely disking or tillage with sweeps at 5"-6" depth will not iradicate leafy spurge or dyers wood, unless continued throughout growing season.

Hand pulling or digging on dyers wood or spotted and diffuse knapweed is effective if proper lenght of root is removed.

Biennials may be effectively destroyed by digging, tillage and cutting to prevent seeding.

Generally, people assigned to hand pulling and cutting will not cut or dig beneath the surface in cases where soil is dry and hard or rock. Cultivation or tillage limited to rock free soil or terrian suited for tillage equipment.

Disturbing of soil by mechanical methods to destroy weeds provides ideal conditions for weed establishment unless tillage is continued as needed to control seedlings.

Herbicide treatment is still the most effective, as well as economical.

ALTERNATIVE #2

Aerial herbicide application is essential in treatment of weeds in inaccessable areas. There are no effective means to replace aerial applications.

Chemical applications in all cases must be applied by responsbile well trained personnel. Haphazard application in all cases are the cause of problems with pesticides.

ALERNATIVE #3 - no comment

ALTERNATIVE #4 - No Action

This course of action is totally unacceptable. The rapid spread of noxious weeds on BLM land is evidenced by the lack of control or no action during 1984 and 1985.

We are finding weed infestation on BLM land heretofor unifested.

Repetition of this no action policy will create irreversible problems.

Worst Case Analysis

This is very well worded and prepared

CONCLUSION

The entire EIS is well prepared and covers all areas of weed control thoroughly.

Anti-pesticide group or groups are continually taking issue with statements that there is insufficient scientific data on the safety of herbicides. These groups have never provided unquestionably accurate data on the adverse effects of herbicides on human health or the environment, as a whole, caused by herbicides applied at the recommended rate and with strict adherence to the labels.

There has been no scientific data provided us in the effectiveness of biological control of noxious weeds in our area to the point that chemical control may be eliminated.

Those of us involved in herbicides are constantly subjected to the outcry of anti-herbicide groups for the lack of scientific proof regarding the safety. I feel these people should produce accurate irrefutable scientific data stating the danger in the usage of herbicides for weed control.

Sud Morishita, Supt.
Bonneville County Weed Control

31

IDAHO DEPARTMENT OF FISH AND GAME
600 South Walnut • Box 25
Boise • Idaho • 83707

July 25, 1985

Mr. William G. Leavell
Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P. O. Box 2965
Portland, OR 97208

Re: Northwest Area Noxious Weed Control Program DEIS

Dear Mr. Leavell:

Idaho Fish and Game appreciates the opportunity to comment on said document. Generally, because of the small percentage of the state covered by proposed treatments, the Department is not overly concerned with the impacts of your proposal. However, we offer the following comments to improve and lessen impacts of your proposal on fish and wildlife in Idaho.

We note that relaxation of grazing pressure is not mentioned as a preventative management technique (page 8) nor as a biological control measure (page 11). The spread of at least some weeds is partially caused by heavy grazing pressure and relaxation of grazing should be a potential control technique that could be used in such cases.

31-1 The section on "monitoring and studies" (page 11 and page 102-103) is grossly inadequate. You provide no monitoring program to evaluate the impacts on fish and wildlife resources. Your statement that ". . .monitoring systems for other resources (watershed, wildlife, etc.) as identified and outlined in the final decision will be developed and implemented" provides little comfort to those concerned about impacts upon the resource. We can make no determination regarding the adequacy or efficacy of these systems if we have no idea what they are.

31-2 The Department strongly recommends that if you find ". . .potential for significant impacts not already described. . ." during site specific analysis (page 14), you positively require another EIS or supplement. Therefore, we believe ". . .may be required. " (emphasis auded) must be changed to ". . .will be required" (page 14).

• EQUAL OPPORTUNITY EMPLOYER •

31-3 The Department believes you should note that Barbery sheep are not native (page 26-27). There should be some distinction between them and native big game species.

31-4 Antelope occur on many habitats other than ". . .lower elevation sagebrush and grasslands habitats" (page 26). In Idaho, antelope occupy habitats exceeding 8,500 feet in elevation.

Elk calving areas are much more widespread than your statement on page 26 implies.

31-5 We suggest you add a statement, under sage and sharp-tailed grouse (page 27), that forbs are a critical habitat component during spring and summer. Forbs are especially important for brood rearing.

The statement that "Some waterfowl overwinter. . ." is not accurate (page 27). Southern Idaho, among other portions of the EIS area, supports large numbers of wintering waterfowl.

31-6 Baldpate should be added to your list of nesting waterfowl on page 27.

31-7 Your list of nesting raptors is incomplete (page 27). You should add prairie falcon, rough-leg hawk, Ferruginous hawk, burrowing owl, other owls, osprey and probably other raptors. Ravens and other corvids should be mentioned somewhere.

31-8 Sturgeon are a unique fish you have not included in your list on page 27.

We must make the point again (reference your basic assumptions page 34), that failure to detail monitoring procedures (page 11) is a serious concern to the Idaho Department of Fish and Game. We are also concerned regarding what actions you will take if funding and/or personnel to fully implement the final decision is not received. Will 31-9 acreage treated be reduced or will safeguards, monitoring and mitigation be curtailed?

31-10 Table 3-1 (page 35) implies that 2,4-D will degrade rather rapidly but many soils in the EIS area do not meet the criterion of "organic and moist soil" necessary for such rapid degradation.

31-11 The statement on page 36 that "herbicides would most likely enter streams through drift. . ." contradicts the statement on page 37 that ". . .herbicides usually enter a stream channel from surface runoff."

Your discussion of "impacts on vegetation" is substantially weakened by your use of "could" rather than "will" in describing effects of

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treatments. For example, paragraph 1 should read ". . .will effect both target and nontarget vegetation" rather than ". . .could effect. . ." (page 38). Likewise, shrubs and forbs "will", not "could", be weakened or destroyed. Much of the proposed spraying will 31-12 be aerial so general areas rather than individual plants or patches will be sprayed.

You mention that treatment with herbicides would usually occur when livestock are not on the area (page 42) but then ignore the impacts to wildlife which would be on the area when spraying occurred (page 43). 31-13 Because of this, you should address the direct impacts of herbicides on wildlife rather than passing it over because "most impacts on birds and mammals would result from the destruction of nontarget vegetation" (page 43). Destruction of forbs would have a highly detrimental impact upon sage grouse, antelope and other species.

Thank you for the opportunity to comment on this document.

Sincerely,

Jerry M. Conley
Director

JMC:CHM:tlv

RESPONSE TO COMMENT LETTER 31

31-1 See response to common issue 5.

31-2 A potential for significant impacts in itself does not require the preparation of an EIS or EIS supplement. The preparation of an EIS or EIS supplement is not required when a determination of no significant impact is made. Determinations of impact significance arrived at through site-specific analysis of a proposal (including mitigation) will indicate the type of document needed.

31-3 BLM agrees that Barbary sheep are not native. None are reported in the EIS area.

31-4 This is a general description of habitat most often occupied by antelope. In some states antelope occupy a wide elevational range of habitats.

31-5 The discussion of upland game bird habitat has been revised in Chapter 3.

31-6 American widgeon (baldpate) has been added to the list of nesting waterfowl.

31-7 The Wildlife Section on nesting raptors has been revised.

36-8 Sturgeon has been added.

31-9 Acreage treated and monitoring would be reduced proportionately. Also see response to comment 69-4.

31-10 A check of the summaries of selected studies on the persistence of 2,4-D under laboratory and field conditions found that 2,4-D and its formulations have a short persistence in most soil environments and that the main mechanism for degradation in soil is microbiological activity. BLM recognizes that the most ideal conditions for 2,4-D degradation (warm, moist soils with high organic matter) occur in western Oregon and Washington and that 2,4-D may persist longer in the more arid portions of the EIS area. A literature review, however, strongly suggests that little potential exists for bioaccumulation of 2,4-D in arid soils using the application rates proposed in this EIS.

31-11 The statement on page 36 of the DEIS refers to applying herbicides by all methods, including aerial spraying with proper use of buffer zone restrictions. In dealing with relative amounts of herbicides from all proposed application methods, the potential can be expected to be greater for herbicides to enter streams by drift. The statement on page 37 of the DEIS was meant to refer to hand application only, in which case, any herbicide that might reach the stream channel would be most likely to do so by surface runoff. The sentence on page 37 of the DEIS has been changed to read, "Therefore, if herbicides originating from hand application reach the stream channels, it is usually through surface runoff."

31-12 Aerial application makes up less than half of the proposed chemical program. See response to common issue 6. Also see response 10-2.

31-13 DeVaney (1968) reported that phenoxy derivatives (which include 2,4-D), when used according to recommended procedures, are not a hazard to livestock or warm-blooded wildlife. The proper formulation of 2,4-D must be used around water because its toxicity to fish and other aquatic organisms is related to the formulation. DeVaney also reported that dicamba used at the recommended rates of application is not a significant hazard to fish or wildlife. Hudson and others (1984) reported that the acute oral toxicity of 2,4-D ranged from the LD50 mg/kg 95 percent CL of 200-400 on chukar to greater than 2,025 on mallards. He also reported the combination of 1,000 mg/kg (0.016 oz/pound) 2,4-D and 1,000 mg/kg (0.016 oz/pound) Tordon 22 K administered by stomach tube were not lethal to two mallard drakes used as test animals. The LD50 for pheasants and mallards is greater than 2,000 mg/kg (0.032 oz/pound).

According to the Herbicide Handbook (Weed Science Society of America 1983), pure 2,4-D acid at 100 ppm caused slight mortality for fingerling bream and largemouth bass. Some formulations of 2,4-D are relatively toxic to fish and should not be introduced into aquatic environments unless specifically recommended on the label. Dicamba and picloram have a low order of toxicity to wildlife and fish. The toxicity of glyphosate to wildlife and fish depends on its formulation.

Since the loss of forbs will adversely affect upland game and antelope, BLM will attempt to avoid using herbicides in key areas used by these species.

32

TILLAMOOK COUNTY
Soil and Water Conservation District
PHONE 842-2240
2204 FOURTH - SUITE B
TILLAMOOK, OREGON 97141

July 25, 1985

Oregon State Director
Bureau of Land Management
R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

RE: Environmental Impact Statement on Noxious Weed Control,
Tillamook County

BY: Roger Pye, Tillamook County Weed Control Supervisor

Tillamook County is located in the northwest sector of Oregon. The county is 60 miles long and 30 miles wide. There are 4 bays, 7 rivers and 3 major drainage basins. Forested land holdings consist of: USFS, BLM, Oregon State Forestry Department and private timber companies. Lowland areas consist of over 200 dairy and beef farms and several small cities and towns.

Because of the high toxic levels in tansy ragwort, an estimated 10 million dollar loss is realized in Oregon annually. This is of utmost concern in Tillamook County due to the thriving dairy industry. Records with the Oregon State Noxious Weed Control Division show Tillamook County to have the greatest tansy ragwort problem within the state.

Another major concern is Canada Thistle. This plant is a creeping perennial, spreading in pastures and killing grass. Cattle will not graze near it and once established, it is difficult to control.

The majority of seeds are spread during the winter months when high waters carry thee downstream and deposit them in lowland pastures. They are airborne when the plants go to seed in late summer and early fall. Due to the influx of seed deposits from upstream sources, control is imperative. Upstream sources are forestlands and thus the burden of control lies with forest property owners. Natural enemies of these noxious weed are non-existent and weeds spread unchecked.

July 25, 1985
BLM - Comments on Environmental Impact Statement
PAGE 2

Because of Tillamook County's rugged terrain, Alternative 2, 3 and 4 are not suitable and cost prohibitive. However, Alternative 1 (aerial spraying by helicopter) is practical, acceptable and cost-effective. Proper safeguards must be heeded and are identified in the Appendix, pages 101, 102 and 103.

Benefits of such a spray program would be: increased forage for wildlife, increased fishery habitat; healthier ground cover and increased use of recreational sites.

In conclusion, the near 50,000 acres of BLM lands in Tillamook County must be controlled and seeds prevented from spreading to the lower agricultural lands. If proper safeguards are met, I believe we have the knowledge and ability to control this ever-increasing problem.

Respectfully submitted,

Roger Pye

Roger Pye, Weed Control Supervisor
TILLAMOOK COUNTY SWCD

RP/ln

33

JACK S. WAYLAND
Director

STATE OF WASHINGTON
DEPARTMENT OF GAME
600 North Capitol Way, GJ-11 • Olympia, Washington 98504-0091 • (206) 753-5700

July 23, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Draft EIS: Noxious Weed Control Program - Northwest Area

Dear Mr. Simmons:

Your document was reviewed by our staff as requested; comments follow.

The proposed action is to apply various herbicides in conjunction with manual and biological methods to control noxious weeds annually on 24,564 acres. Though it is not clearly indicated in this document, such an action has the potential to result in significant adverse impacts on a variety of fish and wildlife and habitat types, especially at the state level, and most certainly on a site-specific basis. The short section devoted to impacts on wildlife on page 44, however, fails to demonstrate this. Instead, impacts are dismissed as being "temporary" or avoided because treatments would "displace" animals. We do not consider annual treatments to be temporary. And, animals are not simply "displaced" if their habitat is altered or destroyed. Other habitat, if available, is generally already at its natural carrying capacity and cannot support additional wildlife. Therefore, rather than being displaced, wildlife numbers and kinds would be lost. 33-1

It is indicated on page 11 that this environmental impact statement is a "regional programmatic" statement and that, "Site-specific environmental analysis and documentation....will be accomplished at the state or district level..." We trust that sections of the upcoming documents pertaining to fish and wildlife can be expanded to provide the level of detail necessary to describe and assess adverse impacts in an adequate fashion. We also recommend that more detailed maps of treatment areas be provided along with plans for the timing of treatments.

Page 2

Thank you for the opportunity to provide comments at this time.

Sincerely,
THE DEPARTMENT OF GAME

Fred H. Maybee

Fred H. Maybee, Applied Ecologist
Habitat Management Division

FHM:jt

RESPONSE TO COMMENT LETTER 33

33-1 BLM-administered land accounts for approximately 16.5 percent of the EIS area. The proposed action would result in treatment of less than 0.1 percent of BLM-administered lands in the EIS area. There would be few instances when wildlife habitat would be significantly altered or destroyed as a result of the proposed weed control program. In these instances, habitat alteration or destruction would be temporary (not extending beyond one growing season) and limited to small localized areas. (This conclusion takes into account incorporation of appropriate design features, see Chapter 1, Weed Management Treatments and Appendix I, Project Design Features.) Although loss of life could occur to some small animals in those localized areas, the overall effect on individual species populations would be insignificant.

34

STATE OF WYOMING
OFFICE OF THE GOVERNOR
CHEYENNE 82002

ED HERSCHLER
GOVERNOR

July 25, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Mr. Simmons:

The draft environmental impact statement for the Northwest Area Noxious Weed Control Program has been circulated among Wyoming state agencies for review. Wyoming appreciates this opportunity to provide input regarding this document and the enclosed comments are forwarded for your consideration.

Please keep me informed as a decision document is developed. If you have questions regarding these comments or require additional information, feel free to call.

Sincerely,

Dick Hartman

Dick Hartman
State Planning Coordinator

DH:rml

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

Wyoming Department of Agriculture

TELEPHONE (307) 777-7321 CHEYENNE, WYOMING 82002-0100

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DEAN COLLEGE OF AGRICULTURE
UNIVERSITY OF WYOMING, LARAMIE

June 26, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simm[illegible]
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Leavell:

Re: EIS, Northwest Area Noxious Weed Control Program

We appreciate the opportunity to comment and critique the EIS. It appears the interdisciplinary team put together a solid and sound EIS based on all the facts and methods that are available to us today. Putting together a realistic approach in today's society is a difficult chore to accomplish.

It is not to be implied or the intent to be critical of the EIS, however, I think it is necessary to make some comments on some of the suggestions and interpretations in the proposed program. All of the comments refer to Wyoming only.

34-1 In the summary under Cultural Resources, are these areas where people are illegally growing Hemp (Cannabis sativa)? If this is the case, maybe it should be spelled out.

Chapter 1, Purpose of and Need for Action, Table 1-1. Acres Affected by Noxious Weeds in EIS Areas, page 2.

Figures outlined were based on actual systematic weed inventory surveys. The survey was completed in 1976 and 77 on federal, state and private rangeland and covered approximately 3.1 million acres. By using a rule of thumb, based on actual surveys, we can project the acres of designated and declared noxious weeds on Wyoming rangelands. Figures do not include other undesirable species such as artemesia tridentata or similar species and undesirable grass species such as Bromus tectorum.

"AGRICULTURE—the backbone of Wyoming"

Rangeland and Permanent Grass Pastures

	BLM Land	State Land	Private Land
Total Acres	14,133,212	3,593,271	20,601,029
Acres of Noxious Weeds	14,133	35,932	206,010
Percent	0.1%	1%	1%

34-2 I do not want the reader to misconstrue that we only have 18,391 acres of noxious weeds.

Alternatives Including the Proposed Action, Page 6

Alternative 1: The proposed action (PA). The proposed action should include: (1) preventive measures, (2) physical control methods, (3) biological control, (4) herbicidal control methods, (5) management practices. Selection of the control measures used for any treatment site will be determined by economic, environmental and management factors unique to each site. The interaction of the factors enhances the potential combination of two or more measures. Selection of control measures is determined by: (1) the characteristics of the weed species (annual, biennial, perennial), (2) location of the infestation (cropland, permanent grass pasture, rangeland, riparian, roadsides, non-riparian).

Noxious weed control should be included in an interpretative program so persons using the area would understand what is going on and why. Alternative 1 meets the objectives of the Wyoming Weed and Pest Control Act. Alternative 3: No use of herbicides. This alternative should only be considered on annual or biennial weed species on small acreage.

Alternative 4: No action. Alternative does not meet the objectives of the Wyoming Weed & Pest Control Act and is not a viable alternative. It also does not meet the objectives of Federal land Policy and Management Act (P. L. 94-579), Public Rangelands Improvement Act (P. L. 95-514), Carlson-Foley Act (P. L. 90-583) nor Federal Noxious Weed Act ((P. L. 93-629).

Weed Management Treatment and Design Features: Chemical Methods, page 8. Aerial Application: (Label requirements). When applying by aircraft pilot must comply with all applicable state and local regulations. When applying by air, use coarse, low pressure (under 30 psi) to minimize spray drift. To aid in further reducing spray drift, a drift control and deposition aid such as Nalco-Trol may be used. Should use straight stream nozzles directed straight back, by using spray boom no longer than 3/4 of the wing or rotor length. Do not apply when air temperature exceeds 85 degrees F or when an air temperature inversion exists. Wind speed restriction should be changed from 5 mph to not to exceed 6 mph. Wind speed on granular herbicides should be changed from 10 mph to not to exceed 8 mph.

-2-

34-3 Page 9: "Granular formulations would be applied no closer than 10 feet from the high water line of streams and other water bodies." Suggest we follow the herbicide label directions.

State and Local Governments, Wyoming, page 9. One mitigation measure that was designed to minimize contamination potential is Wyoming's Herbicide Monitoring Program. The monitoring program was implemented in 1977 and was set up to: (1) protect the noxious weed program in Wyoming, (2) assure the public we can safely apply herbicides and not exceed water criteria standards, (3) protect the environment, (4) protect the herbicides and be assured they will be available in the future, (5) DEQ and Federal water quality standards, (6) study soil residues of various herbicides. I believe this information should be mentioned in the Wyoming section. Herbicide monitoring records are 34-4 available covering the period from 1977 through 1984. It should be noted on page 21, Surface Water, where it states "The maximum concentration found was 0.18 ug/l". This amount detected was in an area where approximately 150,000 lbs. of Tordon bead was applied by aerial 34-5 application. Based on available toxicity data and water quality criteria herbicide concentrations identified do not constitute dangerous harmful concentrations to humans or the environment.

34-6 Chapter 2, Vegetation, Terrestrial Vegetation, page 21. Field bindweed, Perennial pepperweed, Skeletonleaf bursage, Scotch thistle, Common burdock, Houndstongue and Larkspur should be added to the list.

34-7 Economic conditions, page 30. Third paragraph should be changed to read "increase livestock and wildlife forage."

34-8 Chapter 3. Environmental Consequences; impact on Animals, page 42, Dairy Animals. Should be changed to read "Lactating Dairy Animals."

Appendix 1, Project Design Features. Comments made earlier in this letter should apply to this section.

It appears your group has put together an excellent comprehensive plan. Please feel free to contact us any time for any additional information we may have in our files.

Sincerely,

George F. Hittle

George F. Hittle
Weed & Pest Coordinator

GFH:sw

cc: John Orton, Commissioner
Dick Hartman, State Planning Coordinator
Darrell Drake, President, Wyoming Weed & Pest Council
Files: USDI/BLM

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

State Engineer's Office

HERSCHLER BUILDING CHEYENNE, WYOMING 82002

July 9, 1985

MEMORANDUM

TO: Paul Cleary, Natural Resource Analyst
State Planning Coordinator's Office

FROM: Louis E. Allen, Water Resources Engineer LEA

SUBJECT: State Identifier No. 85-195, Northwest Area
Noxious Weed Control Program, DEIS, BLM
Oregon State Office, May 1985.

I have reviewed the subject Draft EIS primarily for water resources effects. Since the proposed action would not be consumptive of either surface water or ground water, we have no agency objection to the action. We do trust that the quality of water will be protected in so far as possible from herbicide contamination.

I do have one comment to offer, which is more in the nature of a question. On page 29, Table 2-1, Threatened and Endangered Animals, the Bonytail Chub and the Humpback Chub are listed as endangered in 34-9 Wyoming. To my knowledge, I don't believe these are found in Wyoming at the present time. In the same Table, the Colorado Squawfish is listed as endangered in Washington. Again, to my knowledge, this is apparently a different species from that found in the Colorado River.

Thank you for the opportunity to comment on this Draft EIS. Your referral memorandum is being returned as requested.

LEA/ht

cc: George . Christopulos
State Engineer

THE STATE OF WYOMING
EXECUTIVE DEPARTMENT

ED HERSCHLER
GOVERNOR

Office of Industrial Siting Administration

THIRD FLOOR BARRETT BUILDING CHEYENNE, WYOMING 82002 TELEPHONE 307-777-7368

July 15, 1985

Mr. Dick Hartman
State Planning Coordinator
Herschler Building
Cheyenne, Wyoming 82002

Re: Northwest Area Noxious Weed Control Program, SI No. 85-195

Dear Dick:

The Staff of the Industrial Siting Administration has reviewed the draft EIS for the Northwest Area Noxious Weed Control Program and offers the following comments:

p.43 Impacts on Wildlife

This section should discuss direct impacts of herbicides on vertebrates. Appendix K describes a few documented effects on rats, mice, and dogs but these obviously are not directly applicable to all species of wildlife, particularly not to birds, reptiles, and amphibians. 34-10 This section should be expanded to include an objective risk analysis on the direct effects of herbicides on wildlife with thorough justification of conclusions. Impacts that cannot be predicted with any certainty should be described. In this way precautionary measures can be implemented in sensitive areas to prevent loss of wildlife.

p.44 Impacts on Fisheries

34-11 The above comments generally apply to this section also. Results of any chronic or reproductive toxicity testing is noticably lacking in Appendix K. Justification for the conclusion that the four herbicides "should cause no adverse effects" is needed.

Mr. Dick Hartman
Page 2
July 15, 1985

p.101 Project Design Features

34-12 How is contractor compliance with these conditions monitored and enforced?

34-13 Timing of herbicide applications to avoid nesting, spawning, and calving/fawning period; or other sensitive periods in the life histories of species of high interest or critical concern should be used to reduce impacts.

Thank you for the opportunity to comment.

Sincerely,

Richard C Moore

Richard C. Moore, P.E.
Director

RCM/TCC/lb

MEMORANDUM

TO: Mr. Robert E. Sundin, Director
Department of Environmental Quality

FROM: Tim Link, Solid Waste Specialist
Solid Waste Management

DATE: July 19, 1985

SUBJECT: Comments concerning DOI BLM, NW Area Noxious Weed Control Program EIS

The Solid Waste Management staff offers the following comments concerning the NW Area Noxious Weed Control Program EIS.

Excess pesticide/herbicide should be used up for its original intended purpose. Waste pesticide is not allowed to be diposed of at waste disposal sites in the State unless written permission is obtained from the Department.

Empty pesticide/herbicide containers can be disposed of into municipal landfill sites in the State provided the containers are triple rinsed, punctured, and crushed according to the label directions.

We thank you for allowing us to provide these comments to you concerning the NW Area Noxious Weed Control Program EIS.

THE STATE OF WYOMING
ED HERSCHLER
GOVERNOR

Department of Environmental Quality

LAND QUALITY DIVISION

HERSCHLER BLDG. · THIRD FLOOR
122 WEST 25TH
TELEPHONE 307 777-7756
CHEYENNE, WYOMING 82002

MEMORANDUM

TO: Robert E. Sundin, Director

FROM: Roger Shaffer, Administrator RS

DATE: June 28, 1985

SUBJECT: Request for Comment on NW Area Noxious Weed Control Program EIS

The Land Quality Division has reviewed the NW Area Noxious Weed Control Program EIS. We have identified some specific areas of concern and would like to offer the following comments pertaining to noxious weed control as it relates to mining in Wyoming.

General:

The control of noxious weeds on disturbed lands caused by mining activities was not addressed in the EIS. Such control on a mine site must be initiated by the mine operator and addressed in an approved mine plan.

Of the four control alternatives listed, alternatives #1 and #2 appear best suited for control of the noxious weeds on mine sites. Control should be closely monitored by regulatory agencies to assure that spreading of noxious weeds is prevented.

Specific:

1. Chapter II, Section 2.a.(1)(b)(iii) of the Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD) Rules and Regulations requires all permit applications to discuss noxious weeds. All 14 of the noxious weeds targeted in the EIS are listed in WDEQ/LQD Guideline Number 2 (1984 Draft) as noxious weeds that need to be addressed.

Mine permit applicants presently agree to coordinate their weed control efforts with county weed control districts.

These two factors will minimize potential conflicts between mine reclamation programs and the proposed federal program.

2. The preferred alternative (alternative 1) proposes chemical treatments on 86% of the lands to be affected by noxious weed control. Aerial, ground vehicle, and backpack methods will be involved in chemical treatments.

Robert E. Sundin
June 28, 1985
Page Two

It is recommended that all chemical control on lands to be affected by mining and on revegetated lands be done with a backpack sprayer (spot control). This method poses the least damage to non-targeted shrub and forb species. Only nonpersistent herbicides should be used on these lands.

3. Noxious weeds that become established in reclamation vegetation control areas should be controlled only by spot chemical or manual methods after consultation with WDEQ/LQD personnel.

We thank you for the opportunity to comment on this document.

RS/KMD:kv

cc. Roy Spears
Jack Smith

RESPONSE TO COMMENT LETTER 34

34-1 See the Glossary for a definition of cultural resources.

34-2 See text revision, Purpose of and Need for Action, Chapter 1.

34-3 All formulations of herbicide application on BLM-administered lands must meet or exceed the herbicide label and individual state standards.

34-4 See text revision, Interrelationships, Chapter 1.

34-5 Thank you for your additional information. BLM used that figure as an indication of existing background stream water quality data with the understanding that the application rates were normal for that agricultural area. As indicated by your letter, perhaps this is not the case; therefore, the background concentrations would be expected to be less than noted by the water sample analysis. The text has been revised to indicate that concentrations occurred from treatments within a large agricultural area and may have occurred during a heavier than normal treatment period.

34-6 Five of the species suggested for addition to the terrestrial vegetation section are listed in Appendix C. The other two species, common burdock and Houndstongue, could be targeted for control when they exist on a designated state or county noxious weed list. Also see response to comment 7-1.

34-7 The text has been changed as suggested.

34-8 The wording on page 42 of the DEIS referring to dairy animals is the same as stated on some herbicide labels. Other labels refer to lactating dairy animals. See response to comment 34-3.

34-9 The Colorado squawfish should have been listed for Wyoming rather than Washington. Table 7-1 has been corrected.

34-10 See response to comment 31-12 and 31-13.

34-11 See response to comment 31-12 and 31-13.

34-12 Item 12 on page 102 of the DEIS discusses who will monitor application operations. A BLM project inspector will be present during actual application on all contracted aerial spray projects. Periodic field checks would be made during actual application on contracted ground spray projects.

34-13 Herbicide applications would be timed to avoid serious wildlife conflicts. This concern will be addressed in site-specific environmental analyses with appropriate documentation. See final EIS, Appendix I.

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

Game and Fish Department

CHEYENNE, WYOMING 82002

W. DONALD DEXTER
DIRECTOR

July 12, 1985

EIS 2726
USDI/BLM-NW Area Noxious
Weed Control Program EIS

Mr. Dick Hartman
State Planning Coordinator
Herschler Bldg.
Cheyenne, WY 82002

Attention: Mr. Paul Cleary

Dear Mr. Hartman:

In response to your notification EIS 85-195, we have reviewed this EIS and offer the following general comments and specific recommendations to be forwarded to the appropriate Federal and State agencies to make the final document more complete and accurate in considering wildlife resources.

General Comments:

34-14 We feel the assumption that the preferred alternative (Alt. 1) would eliminate the spread of noxious weeds to noninfested lands to be questionable in light of past control efforts by other agencies and individuals. The spread of noxious weeds from lands not subject to control, i.e. non-BLM lands, is likely to occur despite BLM efforts.

34-15 We suggest the last paragraph on page 7 also needs some clarification. The costs to the public for weed infestation, appraisal, and control costs prior to any land exchanges should be considered, particularly if the land is under the asset management program and is being transferred to private ownership. The time frame and mechanism for determining when control
34-16 efforts are satisfactory should be outlined. Finally, we wonder if this provision will also apply to the proposed FS/BLM Land Interchange Program.

34-17 Alternative 1 may have some negative economic impacts if the program reduces wildlife species dependent on forbs, shrubs and/or trees for food and cover.

34-18 On page 17 in paragraph 4, we recommend that the statement indicating that the Wyoming Game and Fish Department manages big game be amended to read that 'the Department, by statute, manages all wildlife in Wyoming.'

We can support Alternative 1 (Proposed Action) provided the following recommendations are adhered to:

1. Special care should be taken to protect non-target vegetation in riparian areas which provide bank and soil stabilization and stream shading.

Mr. Dick Hartman
July 12, 1985
Page 2 - EIS 2726.

2. Herbicides should not be applied near streams during yolk-sac and swim-up fry stages of trout.

3. Adequate buffer zones should be maintained with each method of application so no herbicide is applied directly in any water body.

4. The BLM should take the necessary action to insure the Application Contract Requirements of the Project Design Features, Appendix 1 are closely adhered to.

5. We feel the activities described in the Monitoring and Studies section, Project Design Features, Appendix 1, are a very important part of the program and should not be circumvented or deleted.

We are concerned about the use of picloram adjacent to streams that contain fish populations, especially rare or sensitive species like Bonneville and Colorado River cutthroat trout. Past research has concluded, . . . 'that picloram should be applied on rangelands in a manner such that residue in adjacent streams and lakes does not exceed 290 ug/l following the first major rainfall after application. Since rainfall is not predictable, an adequate buffer zone should be maintained between natural waters and the application area and picloram should not be applied on stream and lake slopes.'

Therefore, we reiterate the need to maintain buffer zones and use extreme caution when herbicides are applied in areas where adverse impacts to wildlife and fisheries resources can occur.

Please forward this information to the appropriate Federal agencies and contact us if we may be of further help.

Sincerely,

Francis Petera

FRANCIS PETERA
ASSISTANT DIRECTOR
OPERATIONS

FP:HBM:sec
cc: ~~Game Div.~~
Fish Div.
HATS Div.

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

WYOMING RECREATION COMMISSION

122 WEST 25TH HERSCHLER BLDG. CHEYENNE, WYOMING 82002

ALVIN F. BASTRON, P.E.
Director
777-7695

July 17, 1985

Mr. Dick Hartman
State Planning Coordinator
Wyoming State Clearinghouse
122 West 25th Street-Herschler Bldg.
Cheyenne, Wyoming 82002

RE: 85-195

Dear Mr. Hartman:

The Environmental Impact Statement for the Northwest Area Noxious Weed Control Program was received by this office on June 4, 1985. Thank you for the opportunity to participate in this review process.

The Wyoming Recreation Commission (WRC) staff supports Alternative No. 1 as the best approach provided that the Bureau of Land Management (BLM) follows the various pesticide rules and regulations as prescribed by both the EPA and state agencies. Alternatives No. 2 and No. 3 and No. 4 would only be cosmetic in nature and not adequate to achieve the desired results.

The WRC staff does have a few concerns which should be addressed by the BLM, including:

1. For the most part the EIS fairly well defines the chemicals planned on being used, their toxicity levels and their effects on the environment. It also shows a generalized noxious weed distribution throughout the region.

34-19 But it does not show what area the BLM manages, the number of acres they manage, the approximate number of acres infested, or the priority areas to be treated. The EIS states that the BLM plans on treating 1290 acres, at most, annually in Wyoming. Without knowing what the total acreage infested is, it is hard to determine if this is a feasible plan or just a token effort.

2. The BLM states it will work with the state and county weed and pest districts to do control work but says nothing about working with other federal agencies. The lands managed by the BLM often border other federal property, such as the Bureau of Reclamation. Wouldn't it be most beneficial for all federal agencies if they would combine their efforts and funding? The federal agencies could achieve more working together than each working separately towards the same goal.

3. It seems the trend of the federal agencies is that the managing agency should foot the bill for all noxious weed work since the managing agency benefits from such work. This is not necessarily correct. If the land managing agency daily operation encourages the spread of noxious weeds, then they should be required to pay for the control work. However, in most cases, the landowner is the one who really benefits by having cleaner lands and reducing the spread of noxious weeds to neighboring lands or downstream. Therefore, the landowner should be the agency required to control the noxious weeds. This is especially true if the land management agency's effort is a result of regulations promulgated by the federal landowner.

If you have any questions or need additonal information, please feel free to call.

Sincerely,

Alvin F. Bastron

Alvin F. Bastron, P.E.
Director

AFB:JB:lcl

34-14 Noxious weeds will probably spread from non-BLM lands not subject to control. BLM, however, does not have the responsibility for controlling weeds on non-BLM land. BLM's responsibility is to control noxious weeds on BLM land because these weeds are reducing rangeland productivity and spreading to nearby noninfested lands. Also see response to comment 15-1.

34-15 It was not intended to imply that BLM would take measures to control or eradicate noxious weeds on a parcel of public land as a prerequisite for sale or exchange. BLM would note if the land is infested in the land appraisal. It would be the responsibility of the new land owner to control the weeds after possession is taken. The text has been revised to clarify the intent.

34-16 The presence of noxious weeds will not be a consideration in exchanging lands targeted under the proposed BLM-Forest Service interchange.

34-17 See responses to common issue 6 and comment 29-2.

34-18 The text in the Interrelationships section of Chapter 1 has been changed as suggested.

34-19 Table 1-1 in Chapter 1 gives the acreage breakdown by state and estimated acres infested with noxious weeds. Note that not all acres of known noxious weeds would be treated, only what BLM could feasibly treat on the basis of funding and proper environmental constraints.

RESPONSE TO COMMENT LETTER 35

35-1. Appendix J presents an analysis of program costs on a per acre basis. A discussion on the total program cost by alternative is presented in table 3-3.

35

COOPERATIVE EXTENTION SERVICE
University of Idaho
College of Agriculture
In Cooperation with the
U.S. Department of Agriculture

P.O. Box 160
Challis, Idaho 83226
Phone (208) 879-2344

July 29, 1985

Oregon State Director
Bureau of Land Management (935)
I R. Gregg Simmons
P.O. Box 2965
Portland OR 97208

Dear Mr. Simmons:

Thank you for the opportunity to comment on the Environmental Impact Statement (EIS) for noxious weed control in the Northwest. I am in favor of Alternative Number 1.

A coordinated effort as proposed in this alternative is the best approach to solving our problems concerning noxious weeds or any other concern on Public Lands. We must be able to use all means possible to control noxious weeds. To limit the ways we can control weeds would be like trying to win a horse race with a three-legged horse. If we are to succeed, we need to have access and use of all tools available.

35-1 One concern I have is that nowhere do you talk about the cost of controlling noxious weeds. Any form of control is costly. We can have the best written EIS, with the favored alternative as our method of control, but without budgets to control, we might as well have approved Alternative 4 in the statement. Past experience has shown that without money for control and people dedicated to controlling noxious weeds, we go nowhere, and the weeds go everywhere.

Again, thanks for the opportunity to comment. Let's get on with Alternative 1 with enough money to do the job right!

Sincerely,

James H. Hawkins
Custer County Extension Agent

JHH/bp

MONTANA STATE RURAL AREAS DEVELOPMENT COMMITTEE

36

July 25, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

Our Montana State Rural Areas Development Range and Livestock Committee is a private citizens organization. Our goal is to assist in the development of Montana's natural resources. Therefore, we would like this opportunity to comment on the EIS addressing the Northwest Area Noxious Weed Control Program.

First, we want to emphasize that the noxious weeds on public lands need to be controlled. Furthermore, we feel that it is important for the BLM to continue its coordination with the states, counties and private landowners to ensure an effective control program.

Second, we want to commend your EIS team for doing a good job with limited information. However, we are concerned about the lack of a viable alternative. Although we recognize that the alternatives are dictated by bureau policy — in this case, there is no evidence that these alternatives are in the best interest of resource management. It is ridiculous to address alternatives that forbid 1) the aerial application of herbicide in our inaccessible rangelands; 2) any use of herbicides, knowing full well that mechanical treatment is impossible on rangeland, and there is no evidence that an effective biological control program can be implemented in the forseen future; 3) all methods of weed control. Adoption of this latter alternative would be in violation of state and county laws and would result in irreparable harm to our public rangelands.

Our public lands deserve some realistic alternatives. On page 21, it is stated that an average of 172,000 acres of land were treated in 1982 and 1983. Since then, we believe that the weed population has spread and the threat is now worse than ever. Therefore, we feel that your weed

36-1 control program needs to be expanded not reduced to a mere token effort.

We feel that your EIS should be rewritten. Furthermore, it should consider "realistic alternatives". As a suggestion, we recommend alternatives of 1) maintaining 1982 and 1983 weed treatment levels of 172,000 acres annually, and 2) increasing the weed control effort to the level needed to stop it from spreading further — this may require treating an indefinite number of acres.

Oregon State Director, BLM
July 23, 1985

Page 2

In summary, weeds are a serious threat to the future productivity of our public rangelands. Therefore, we want to re-emphasize that the BLM needs a program that will effectively control weeds.

Sincerely,

P. T. Hacker

P. T. Hacker
Chairman, RAD
Range Livestock Committee

clj

RESPONSE TO COMMENT LETTER 36

36-1 See response to comment 18-1.

37

Challis, Idaho
July 27, 1985

Oregon State Director - B.L.M. (935)
℅ Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sir; After reviewing your draft E.I.S. for the Northwest Area Noxious Weed Control Program the Board of County Commissioners for Custer County, Idaho have authorized me to write to you urging the adoption of the proposed action "Alternative #1". Noxious weeds are a serious problem in this County and we need to use every method & tool available to control them.

The Custer County Commission has experienced a reluctance by private property owners to control weeds on their property when nothing was being done about weeds on adjacent public lands. As about 93% of our County is in federal ownership our weed control program is at a standstill. Therefore we need a progressive, adequately funded federal weed control program.

Sincerely
Tom C[illegible]
Commission Custer Co. Idaho

38

R. Gregg Simmons
EIS Team Leader
BLM Oregon St Office
POB 2965
Portland, OR 97208

Dear Sirs:

I am a member of the Washington Native Plant Society and am very interested in obtaining a copy of the EIS concerning the control of noxious weeds in Washington, Oregon, Idaho, Montana, and Wyoming. If possible could you send a copy to the address below.

Also I would like to enter the following public comments pertaining to the issue to be entered before July 31:

Thank you very much for your consideration.

Sincerely, Michael Pilarski
PO box 1064
Tonasket, WA 98855

Public comments to be entered:

38-1

Herbicide proponents often fail to point out that where spraying, without reseeding desired species, weeds will almost always be as bad or worse after the spray effects wear out.

Herbicides not only wipe out weeds, they also wipe out almost all native plants in their path. Weeds are tough competitors and usually are the first to come back. Native plants become progressively less and less in the landscape.

A lot of herbicides were developed for warfare purposes. The world's greatest experiment in herbicide warfare was the United State's use of herbicides in Indochina, with its continuing legacy of malformed babies, agent-orange contaminated veterans, ecological disaster, etc. The western states of the United States appear to be becoming an even larger experiment, the results of which we will have to live with for a lot of years to come. Herbicide sprayers please note that courts are awarding hundreds of millions of dollars in claims to herbicide victims, both Vietnam veterans and to citizens involved in domestic uses.

READEX FICHE

RESPONSE TO COMMENT LETTER 39

39-1. See response to comment 20-2 and common issue 6.

Box 531
Thompson Falls, MT

July 30, 1985

State Director (935)
Bureau of Land Management
P. O. Box 2965
Portland, Oregon

Dear People:

Reference is made to your excellent report titled "Northwest Area Noxious Weed Control Program--Environmental Impact Statement" of May 5, 1985.

This can be a very important "milepost" on the road to successfully dealing with what may well be the most serious impact of forest-rangelands since the Ice Age.

We have been controlling Knapweed on our 300 acres of forest-rangeland and meadows with annual grazing and tree farming in western Montana for 37 years, although almost completely surrounded now by uncontrolled saturated stands of Spotted Knapweed. No other weed species has presented a serious challenge in our 95 years of family history on this place.

My comments on your draft are as follows:

1. Concur strongly with your "Alternative 1: The proposed action PA)." It is assumed that especially Knapweed and Leafy Spurge control planned would be by other means than "biological (insect) control" until such time as biological research experiences some documentation of control of those species.

39-1 2. Concur with "Appendix C-1, Target Species to be Treated," except that Goatweed (Hypercium perferatum), which is recovering after quite complete biological (insect) control in the 1940s and 50s, might be added as a target species at least in western Montana, north Idaho, and eastern Washington.

Priority will, of course, vary by districts, but the greatest spread and damage risk species to otherwise good-conditon native forest-rangeland, will usually include the Knapweed-Leafy Spurge invasion "crises" species referenced to here as "Knapfire." Thus, an infes-tation of one or more of the four listed species of Centaurea in C-1, or Leafy Spurge, or one or more of the two or three other locally worst weed species included in your same C-1 list, likely will comprise the more serious invasion and thus called "Kanpfire" in this paper. Canada Thistle and other showy "cropland" and depleted-land weeds which stop spreading or recede where revegetation

State Director (935)
July 30, 1985
Page 2

and/or good range management is applied, should be at the bottom of this priority list, in my opinion, in this emergency, i.e., concen-trate efforts toward control and eradication of top priority weed species (Knapfire) on native forest-rangeland, as distinct from cropland priority weed species where they are different.

The following items are submitted with the intention that if there is an idea in it that you can use to further the effective control of Knapfire on the ground by 1995, then use it.

1. With a Knapfire blow-up potential from 20 million acres in the Northwest now to 40 million acres (@ 27.4% compounded annually) by 1990, and maybe 100 million acres by year 2000, and business losses from Knapfire alone estimated in the billions annually, the bottom line must be: Stop It While It Is Still Small. It appears timely to enlist assistance from the several other adjoining states and agencies in an expanded zone-wide EIS following completion of this one.

2. Enlist substantial immediate assistance from ARS or similar credible research body on documentation and analysis of Knapfire spread patterns related to motor vehicle travel and other carriers. Assistance might be requested on the basis that Knapfire is a "soil disease" that destroys native vegetation somewhat like hoof-and-mouth disease destroys animals. Ask them to help you prepare a "Knapfire Prevention, Control and Eradication Handbook for Western Forest-Rangelands" targeted for publishing about 3/1/87, with policy, goals, and methods summary.

   Stress that the main step necessary for effective spread prevention is documentation and recognition that the key "culprit" in spreading Knapfire is motor vehicle travel. (The basis of Alberta Province Knapfire Prevention, Control and Eradication Strategy, i.e., "start investigation at the scene of the crime.")

   Stress that careful mapping of Knapfire weed species patterns from initial starts on interstate, northwest zone-wide motor vehicle routes will provide the most significant information base for the documentation and analysis proposed above. Emphasize that it will also provide a logical base for spread prevention, control, and eradication plans and a public awareness news source. It will also provide a lead for revenue inhancement for the purpose of funding cost-share expense on private lands from motor vehicle driver fuel purchases or similar means.

   Stress the interstate zone-wide coordination need for organized monitoring and treatment of Knapfire weed species that seed, germi-nate, and spread first along principal motor vehicle routes not

State Director (935)
July 30, 1985
Page 3

adequately monitored and treated, and then continue secondary infestation on lateral motor vehicle routes, and finally a much slower spread pace radiating from these motor vehicle routes.

3. Stress the need for "extention" to all sectors of the public in the Northwest, including "The Man in the Street" in all urban and rural centers, grade and high school, and universities, textbooks, libraries, groups, forums, etc. in addition to the agricultural sector.

   Try very hard to establish an effective interstate zone-wide public awareness program.

   Try very hard to "break" straight news stories for regional news-papers, T.V., and radio at least once a week somewhere in the Northwest on action news topics through the next ten-year period.

   Try very hard to break the "stonewall" resistance attitude to "crises" weed species control on forest-rangeland. the greatest enemy to understanding here is total silence with negative cross-cuts in a quite noise society. The skill and effort required to provide continuing interest and knowledge about Knapfire must exceed that of forest fire control or grasshopper control because it is a more difficult story to tell, though often more damaging than either.

39-2 4. The term "Noxious Weeds" means so many things to many people.

   Perhaps Mike Aderhold of the Montana Department of Fish, Wildlife, and Parks put it best in "Montana Outdoors" (Fall 1984). He said: "These pessimists contend the worst areas should just be written off. Proponents of this view usually proceed with a litany of four or five dozen other weeds 'with the same potential as Knapweed.' All of this leads the uninitiated to believe noxious weed control is something akin to controlling nuclear fission. . . ."

   This "mixing apples and oranges" term "Noxious Weeds" can seriously detract from distinct and priority goals both for forest-rangeland and cropland managers. It tends to complicate a relatively uncom-plicated matter.

Everyone, especially professionals, can better direct dicussion specif-ically to the half-dozen or so forest-rangeland "crises" weed species (that cause practically all of the damage to otherwise good-condition range and referred to as Knapfire species herein) or, on the other hand, specifically to "cropland" weed species, if that is the topic.

State Directo: (935)
July 30, 1985
Page 4

Thank you again for the good draft EIS report.

Yours very sincerely,

Fred H. Mase

Enclosures

RESPONSE TO COMMENT LETTER 39

39-1 It is difficult to forecast which noxious weeds would be given highest priority over the five-state area. During site-specific planning, each BLM district will set priorities for weed control by species or groups of species.

39-2 See response 7-1.

40

VICTOR ATIYEH
GOVERNOR

Department of Agriculture

AGRICULTURE BUILDING, 635 CAPITOL STREET N.E., SALEM, OREGON 97310

July 29, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Gregg:

After reviewing the Environmental Impact Statement Draft for the five northwestern states, I feel that the overall analysis specifically views the problems and the alternatives with a realistic approach.

Weed management is weed control. Communications highlight the interrelationships needed to accomplish weed control and this document supports this. With five states involved and the variety of climatic conditions, the need for state and county weed personnel to be involved is definitely necessary. Selection of control methods vary from county to county as well as state to state. I appreciate the Bureau's goal of long term planning incorporating weed control commitment, because this is needed to enhance the impact on weeds.

A few comments I would like to mention follow:

Page 6: Contract more treatments with counties if alternative number three is accepted or maintain in proposed action.

40-1 Page 7: Single treatments rarely work except with small infestations and biological control which takes several years with weather cooperating.

40-2 Any weed control efforts should include first survey, followed by types of control available (i.e. chemical, mechanical, manual or biological), then appraisal, discussion, and implementation completed with a monitoring program.

Page 11: Under biological methods I would exclude goats.

One additional thought should be noted: Survey and detection are number one and once a weed is found one must be able to act to eliminate the establishment of a target weed immediately to prevent further infestations.

Additional comments are included with this, Gregg, from our staff--Dan Sharratt and Dave Humphrey. Their addresses are at the end of the comment pages.

I was pleased to have been able to work with you and if I can be of more assistance, please feel free to call me at (503)378-4987.

Sincerely,

Bob Brown

Bob Brown, Supervisor
Weed Control Program
Oregon State Department of Agriculture

Comments on Northwest Area Noxious Weed
Control Program BLM EIS Draft

In reviewing the May 1985 BLM EIS draft, I find the draft most acceptable

40-3 with the exception of no comments concerning newly invading weed and specific reference to the most serious noxious weed in the Western United States, namely skeletonweed.

40-4 It is suggested that the following comments regarding "newly invading weeds" be inserted in the chapter on "Purpose of and Need of Action".

Newly introduced weeds, limited in distribution should be eradicated before control efforts are rendered impossible from increased distribution and/or economic standpoint. The Oregon Department of Agriculture has designated such weeds as "A" rated weeds in Oregon.

Skeletonweed is an "A" rated weed throughout the state of Oregon. This weed now infests 3 1/2 million acres in Idaho and up to 3 million acres in the state of Washington. There are active skeletonweed surveys and eradication programs in those counties in Oregon where skeletonweed infestations have been found, i.e. Douglas, Jackson, Josephine, Wasco, Sherman, and Umatilla. There is an on-going survey in all sections of the state plus border regions of Idaho, Washington, and California.

Skeletonweed is a serious competitor in the agriculture, horticulture, and silverculture industries. This weed once established in grain fields has resulted in yield losses from 50 to 75 percent and in some cases fields have been abandoned.

To prevent the proliferation of skeletonweed to the private sector, these limited infestations of this "A" rated weed should be eradicated by the use of an appropriate herbicide. Skeletonweed does not lend itself to eradication by mechanical methods. In fact, control by mechanical means enhances its spread.

The skeletonweed eradication program in Douglas County, which is a state/county effort, has reduced skeletonweed from 300 acres net scattered over 297,000 acres to 30 acres net scattered over 500,000 acres.

Dave Humphrey, Agronomist Supervisor
Weed Control Program
Oregon Department of Agriculture
635 Capitol St. N.E.
Salem, OR 97310

Ph: 378-4987

Comments on Northwest Area Noxious Weed
Control Program BLM EIS Draft

Page 6. Description of Alternatives.

40-5 The dialogue does not make clear that, under Alternatives 2 and 3, less weed control will be accomplished for the same dollar investment as Alternative 1. It is also unclear whether the acreage targeted for aerial control under Alternative 1 will be treated at all under other alternatives.

Page 7. 1st Paragraph "Weed Management Treatments and Design Features"

40-6 The statement is made that "treatment would occasionally have to be repeated in some situations whereas in others a single treatment would suffice." This is an almost unheard of scenario in the real world. Retreatment of escaped and follow-up for several years is the rule for successful control of any noxious weeds that I am aware of.

Paragraph 5 & 6.

Referring to wilderness and WSA wilderness areas are designated as such because there is outstanding value in keeping them in their natural state. The stated policy of "allowing natural ecological processes to occur...." may cause some problems since introduced exotic plants don't play by the same rules as natives. No predators, parasites or diseases in most cases. That's why we're in the bio-control business. Introduced exotic weeds should have no place in natural, or wilderness areas.

Page 8. Preventive Management.

40-7 Maintenance of rights-of-way and road sides free of noxious weeds and required cleaning of all equipment prior to entry, (contract clauses would help) greatly improve the prevention of introductions. Cleaning of BLM vehicles and equipment prior to moving from one area to another would be a big help.

Page 15. Table 1-5.

Goal 3. Fish/Wildlife Areas and Habitats.

40-8 Stated that "*actions* under Alternative 1, 2 and 3 would reduce wildlife diversity". Submit that No Action (Alternative 4) would also reduce *wildlife* diversity, probably more than others.

Goal 4. Outstanding Scenic Views and Sites.

Over the long term scenic views would be impacted by no control as noxious weeds reduced the native plant diversity.

Goal 9. Potential and Approved Recreation Trails.

40-9 Trails would be severly impacted by no control. They serve as areas of disturbance where weeds tend to become initially established and as avenues of spread. A heavy stand of Scotch thistle or Yellowstar makes a trail unuseable.

Goal 16.

40-10 To satisfy the recreation needs of state residents and visitors. Alternative 4 would not protect developed recreation sites from noxious weed invasion. Many of the target species are poisonous, thus endangering lives. Many more present barriers, i.e. the thistles which make areas unuseable. Potential for increased fire danger also exists.

Page 21. Terrestrial Vegetation.

40-11 Add skeleton weed to the list of weeds treated in 1982 and 1983.

Page 34. Impacts of Air Quality.

No control could eventually lead to increased particulate from unplanned burns. Skeleton weed infestations provide a heavy fuel load as do heavy Gorse infestations.

Page 35. Impacts on Soils.

40-12 Short term soil losses from removal of heavy weed stands would be partially mitigated by revegetation (fertilization and seeding) and livestock control which need to be part of the weed control program anyway.

Page 36. Impacts on Surface Water.

40-13 The use of Roundup can leave bare soil which may have an impact on surface water similar to burning. Revegetation is especially important when using a nonselective product such as Roundup/Rodeo.

Page 38. Impacts on Ground Water.

40-14 Picloram presents the greatest danger to ground water of the 4 products addressed when used at high rates.

Page 38. Impacts on Vegetation.

Referring to non-target vegetation losses – the timing of the herbicide application is extremely important in mitigating non-target losses.

Paragraph 9. "non-target plants would be trampled by workers applying herbicide...." No further comment needed.

Page 40. Impacts on Threatened and Endangered Plants.

Most of our noxious weeds are considered weeds because they can out compete desireable plants. Most are non-native and have come to our area without any natural enemies. Unchecked spread of these plants could greatly endanger rare plants. Since "...any action that would contribute to its (rare, threatened, or endangered plant) extinction or to its threatened or endangered status would violate the Endangered Species Act of 1973, as amended", no action under Alternative 4 may be shown to be illegal at sometime.

Page 41. Table 3-2.

40-15 Include cattle under death camas.
Include birth defects under poison hamlock and lupine.

Page 42. Impacts on Animals.

40-16 Referring to biological controls - Livestock removal is not always required.

Page 45. Impacts on Wilderness and Special Areas

40-17 Under Alternative 4, exotic plants would be allowed to invade and spread in these areas. They would thus become less "natural" and likely less ecologically diverse.

Page 45-46. Impacts on Economic Conditions.

Reductions in big game and upland bird populations due to loss of habitat to uncontrolled weeds would decrease hunter and wildlife viewer traffic which would in turn impact local economics.

Page 51. Impacts on Human Health No Action

40-18 Include Silverleaf Nightshade as a potential hazard. The berries are extremely toxic and can be attractive to children.

Distribution Maps - Figures D-1 through D-4.

40-19 Assuming that if there is some in the County, the whole County is colored in.

To the 1980 maps:

Canada Thistle - this plant exists in all counties
Leafy Spurge - add Wallowa, Umatilla, Union, Baker and Malheur Co. Creek.
Russian Knapweed - add Morrow, Umatilla, Union, Baker, Grant, Malheur and Harney Co.
Spotted Knapweed - add Morrow, Umatilla, Union, Wallowa, Baker, Grant and Harney Co.
Dyers Wood - add Union and Lake Co.
Dalmation Toadflax - add Morrow, Umatilla, Union, Baker, Grant and Malheur Co.
Yellow Toadflax - add Union, Wallowa, Baker, Grant and Harney Co.
Hoary Cress - add Umatilla, Wallowa, Grant, Harney and Malheur Co.
Diffuse Knapweed - add Umatilla, Union, Wallowa, Baker, Grant, Harney and Malheur Co.
Common Tansy - add Umatilla, Union, Wallowa, Baker and Malheur Co.
Yellowstar Thistle - add Morrow, Umatilla, Union, Wallowa, Baker, Grant, Harney and Malheur Co.
Musk Thistle - add Morrow, Umatilla, Union, Klamath and Malheur Co.
Scotch Thistle - add Morrow, Umatilla, Union, Wallowa, Baker, Grant and Harney Co.

General Observations:

40-20 There are several new products available which appear to have some real advantages for use on federal lands. This draft statement does not address the use of any other products than the four listed and it seems that some statement should be made concerning the process of bringing in newer, safer, more efficacious compounds DuPont's products, Telar and Escort, currently labeled for rights-of-way and being considered for range and pasture use appear to be very low in mammalian toxicity, are safer and easier to use, and show much greater activity on some of the target species. These and other new products should be closely examined as they become labeled and included in the BLM program where they fit.

Dan Sharratt, Agronomist
c/o Eastern Oregon Agriculture Research Center
P.O. Box E
Union, OR 97883
Ph: 562-5129

RESPONSE TO COMMENT LETTER 40

40-1 Chemical treatment would have to be repeated in most situations. In most circumstances, biological control agents are not achieving control; they are simply creating stresses.

40-2 All BLM weed control projects follow the procedure you described (Appendix I).

40-3 See response to comment 34-6.

40-4 Appendix C lists designated noxious weed species that will be considered for treatment under the Proposed Action. Skeleton weed, an introduced perennial, is on the list. BLM recognizes the serious consequences of the spread of skeletonweed and the limitations on its control that you have discussed.

40-5 Some of the acreage targeted for helicopter treatment in Alternative 1 would be treated by other methods under Alternatives 2 and 3, but not all of it. See Table 1-2.

40-6 The text has been corrected to reflect your comment.

40-7 Cleaning vehicles and equipment before moving from one weed infested area to another would help check the spread of weeds. Such a requirement, however, would be logistically difficult to carry out because water and hoses needed for a thorough cleaning cannot be easily obtained in the field. To help control noxious weeds, mechanical treatment equipment can and will be cleaned by hand after being used in a weed infested area.

40-8 Tables 1-4 and 1-5 have been revised to reflect this comment.

40-9 Revisions have been made.

40-10 Revisions have been made. Concerns about poisonous plants are addressed in the Impacts on Human Health section of Chapter 3.

40-11 Rush skeletonweed has been added to the Vegetation section of Chapter 2.

40-12 See response to comment 6-2.

40-13 Note that only 105 acres are proposed for treatment with glyphosate (Roundup/Rodeo) over the entire EIS area under the Proposed Action. Also see responses to comments 6-1 and 6-2.

40-14 Your statement that picloram presents the greatest danger to ground water of the four herbicides proposed in this EIS when used at high rates may be entirely correct. However, when picloram is used at the suggested rates and with the required safeguards, little potential exists for detectable traces to enter the ground water.

40-15 The text has been revised to reflect this comment.

40-16 The text has been revised to reflect this comment.

40-17 Alternative 4 would allow all noxious weeds (native or exotic) to spread in Wilderness and Special Areas, and compete with native plants.

40-18 Thank you for the information, the text has been revised.

40-19 Thank you for the information. When the DEIS was published, the only existing information was Forcella and Harvey (1981). Appendix D has been revised. Also see response to comment 44-2.

40-20 As new or other herbicides are proposed for use on BLM-administered lands, a similar hazard assessment (Appendix K) would be conducted and appropriately documented. See text addition, Chapter 1, Chemical Methods description.

41

[illegible]

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
[illegible]

July 29, 1985

Mr. R. Gregg Simmons
Oregon State Director
Bureau of Land Management (935)
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

Northwest Area Noxious Weed Control Program
Draft Environmental Impact Statement

The Washington Department of Fisheries (WDF) has reviewed the subject document and offers the following comments.

WDF is the state agency responsible for the management of the food fish and shellfish resources of the state. Food fish includes salmon and other species that inhabit freshwater at sometime during their life cycle. As such, we have a vital interest in all activities that may have an impact on those resources. Noxious weed control has the potential to affect food fish resources directly and/or indirectly in a variety of ways.

Unfortunately, the Draft Environmental Impact Statement is so general that it is not possible to determine the actual affects that might actually occur. I note, however, that under the section Requirements for Further Environmental Analysis, you intend to prepare site specific environmental analysis and documents at the state or district level. I trust that in such analysis and documents the specifics of the proposed program will be detailed so that we can provide meaningful comments.

Please send future correspondence to my attention.

Sincerely,

Duane E Phinney

Duane E. Phinney, Chief
Habitat Management Division

DEP:rc

42

[illegible]

July [illegible], 1985
Bureau of Land Management
PO Box 2965
Portland, Oregon 97208

Dear Sir,

Please accept my comments, as follows, concerning [illegible]
Northwest Area Noxious Weed Control Program - Environmental Impact Statement.

[illegible] use of land resources caused noxious weed problems,
and to correct such apparent problem simply calls for a program of proper land-water management on all private and public lands and waters.

So I oppose all use of all herbicides, as they cause massive damage to all biological resources on this planet Earth;

I [illegible] that only manual treatment be applied to resolve noxious weed problems
mechanical treatments may be used with very strict controls.
Grazing treatments are not yet developed as a practical treatment effort.

May I, then, suggest the following alternative, into control-program [illegible].

42-1 [illegible] manual treatment only;
[illegible] Northwest [illegible] America, [illegible] Earth
free chemical destruction.
As chemicals are now programmed to destroy the biological resources of this now endangered planet by the year 2000
Let us, then, free our Earth by banning the use of all chemicals, permanently, from this [illegible] endangered planet Earth - now - !

Sincerely,

John F. [illegible]

RESPONSE TO COMMENT LETTER 42

42-1 Alternative 3 (No Herbicides), which incorporates 4,800 acres of manual treatment, adequately addresses the manual treatment option.

43

SONCAP

Southern Oregon Northwest Coalition for
Alternatives to Pesticides

P.O. Box 402, Grants Pass, Oregon, 97526
503-474-6034

July 29, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

Thank you for this opportunity to comment on the BLM's Northwest Area Noxious Weed Control Program DEIS. Due to delays in receiving background information requested under the Freedom of Information Act, the comments we enclose today are partial and preliminary. We look forward to a resolution of the issues surrounding the availability of the references cited in the text, and will submit further comments when we have had the opportunity to examine those documents. We ask that those later comments will also be included in the record for the DEIS, since public access to underlying data is essential to fair and open public comment periods.

In general, this draft does not adequately describe the costs, benefits or risks to the human and non-human environment, in order to provide a basis for decision-making. The range of alternatives is too narrow, possibly due to problems in the scoping process which excluded SONCAP, SOCATS, NCAP and other public interest groups and recognized individuals. The Worst Case Analyses are grossly inadequate, and fail to disclose most major areas of data gaps and scientific uncertainties. For these reasons, which we elaborate in the comments submitted today, we would urge you to return to the scoping stage and issue a new draft, if pursuit of this program is important and desirable. This draft, in itself, fails to satisfy either the spirit or letter of the National Environmental Policy Act.

The preferred alternative appears to be extremely uneconomical, based on the information included in the DEIS. Table 3-3 shows an optimistic benefit from the preferred alternative to equal just under 3,000 AUMs. Given the current value of an AUM, $1.35, the 1.4 million dollars proposed to carry out the program would only net about $4,000 in benefits. No action, Alternative 4, would lose only about $7,500 with no expense to the BLM. Even adding that potential loss of AUM's to the projected gain hardly justifies spending over a million dollars.

Furthermore, the losses accumulate over the life of the program. The DEIS estimates a ten to fifteen year plan lifetime, and leaves one to assume that the preferred alternative would be carried out, year after year, losing millions of dollars annually even if the program is completely successful.

Either the program is a gross waste of money, or the DEIS fails to describe any alternative adequately. Many unanswered questions are raised:

43-1 1. What is the basis for believing that the first year program will produce net benefits?

43-2 2. The DEIS fails to analyze or describe the efficacy of the chemical treatments. What should the public expect years two through fifteen to look like in terms of increases or decreases in treated acreages?

43-3 3. Will costs and benefits change or remain the same throughout the life of the program?

43-4 4. The text implies, but does not quantify, positive benefits to local economies due to dollars expended on weed control. What kinds of jobs, in terms of numbers, locality, training, will the various methods of weed control provide? Who benefits from the sale of herbicides?

43-5 5. On page 126, you state that 6,700 acres could actually be treated by a single (helicopter) crew. In the Worst Case Analysis, you say that one crew could treat all five states, but that to be "conservative," you assume that each state will employ a different crew. How many jobs would the program create? Wouldn't manual and mechanical treatments produce more local jobs than helicopter spraying?

43-6 6. The DEIS states that in 1982 and 1983, weed control expenditures amounted to about $344,000. What justifies the jump to 1.4 million dollars?

43-7 7. What was spent on weed control in 1984? What dollars were spent on herbicides?

The range of alternatives is too narrow, due to omissions in scoping.

43-8 SONCAP was not given the opportunity to participate in scoping for this project, despite our longterm, highly visable involvement in herbicide issues.

43-9 Had we been involved, we would have requested that you prepare an alternative based on the principles of Integrated Pest Management (IPM). IPM offers significant advantages, both in terms of costs and environmental consequences. Treatments are based on an analysis of economic thresholds. Pesticide problems are approached from the viewpoints of underlying biological cause, and preventative measures are stressed.

In the absence of an IPM alternative, we must ask that the following factors be considered:

43-10 1. What is the role of grazing in creating weed problems? Can a threshold of overgrazing be established? Would overgrazing result in greater weed problems?

43-11 2. Are native grasses or introduction, such as created wheatgrass, more likely more likely to be invaded by noxious weeds?

3. How do the wildlife benefits of mixed grass, forbs, and brush compare to grazing benefits?

43-12 4. What are the results of past efforts to eradicate weeds? Which weeds seem most susceptible to eradication? How would efforts to control or suppress weeds compare to eradication?

43-13 5. What would it cost to implement a program of livestock management policies aimed at reducing the spread of weeds? Preventative management as described on Page 8 of the DEIS is written as vague "should's", and make no reference to monitoring results.

43-14 6. A scoping participant suggested analyzing the impacts of roads as sources of weed intrusions. Why is this "beyond the scope of the EIS?" What other source of weed introduction could be identified and controlled?

7. What environmental factors such as drainage, low fertility, and climate would discourage weed invasion?

We urge the BLM to issue another draft which includes this important alternative approach.

The DEIS fails to include most of the necessary Worst Case Analyses for herbicides.

The DEIS erroneously assumes that preparation of a Worst Case Analysis is triggered by scientific controversy. In fact, a WCA is a method of dealing with data gaps. The Council on Environmental Quality regulations require that, first, full public disclosure be mad of data gaps in essential information, and then an agencymay elect to prepare a WCA if filling the data gap is exorbitantly expensive or beyond the state of the art. This document avoids informing the public of critical data gaps, ones which have been made part of the legal records in SOCATS and NCAP V. Block, and omits most of the necessary WCA's.

43-15 In April of 1980, the EPA reported data gaps the categories of cancer, reproduction, teratogenicity, neurotoxicity, metabolism, acute oral toxicity, acute dermal toxicity, and dermal absorbtion. The DEIS alludes to this study (p. 124), but only prepared a WCA for cancer.

"No testing for absorption, metabolism, neurotoxicity, chronic toxicity, mutagenicity, fetal toxicity, or induction of birthdefects has been reported for Tordon 101 or any other mixture of 2,4-D and Picloram. Dow Chemical Company has consistently refused to allow public examination of any test data, even after the pesticide law was amended in 1978 to make such information public." from the narrative statement of Dr. Ruth Shearer in NCAP v. Block.

43-16 Most of the registration studies for glyphosate were prepared by IBT laboratories, and are discredited by the loss of original data and the Canadian Health Protection Branch's review following the IBT scandal. Potential chronic effects, including genetic toxicity, need to be analyzed in this EIS, and data gaps identified. Since glyphosate forms an N-nitroso-compound in soils treated with nitrogen fertilizers, it should be examined as a potential carcinogen. (Mirvish, 1975; Vigusson, 1980).

43-17 We are unaware of Dicamba's current registration status with the EPA. The DEIS should list which studies of chronic and acute effects have missing or inadequate studies.

All data gaps must be disclosed, and if the costs of filling them are truly exorbitant, then each gap must be met with an adequate Worst Case Analysis.

The Worst Case Analyses are unreadable, incomplete, and based on questionable assumptions.

43-18 The Worst case analyses are extremely difficult to understand, given the number of discrepancies in use of terms and numbers that appear in the appendix as different from the text. For example, the base case dose rates are based on 1.12 kg ai/ha application of 2, 4-D, but table N-3 suggests the rates would actually be three or four times higher.

43-19 Again, in the explanation of ground crew exposure days, Table N-1 concludes that there will be five. However, if there are four crews per state, and each crew treats 8 acres per day, as the text describes, then it should take twenty days to treat 635 acres.

43-20 The text describes the one hit model of cancer as being the "most conservative," as compared to the multi-stage model, but then says that EPA's multi-stage model is "more conservative." (page 125) What are we supposed to assume that conservative" means? Why has the one hit model been displaced by the multi-stage model?

43-21 The text says that one helicopter crew could treat all five states, but that DEIS will make the more "conservative" assumption that each state has its own crew. What does this mean?

43-22 The Worst Cases Analyses are incomplete, even for the limited chemicals and hazards they analyze. They fail to consider spills, leaky equipment (particularly backpacks), and non-target effects.

43-23 They ignore cumulative effects, although the text discusses background levels of some chemicals in water, and the program is planned in conjunction with state and private weed control programs. Since picloram is a particularly persistant chemical, its cumulative impacts are extremely important.

The Worst Cases Analyses make assumptions in the face of no evidence, and fail to explain critical statistical assumptions.

43-24 For example, there is no data to back up the assumption of muscle concentrations in deer. 43-25 Why do you assume that adolescents drink one liter of water, half of that of adults? It's shocking to state that there is no data on the effect or rate of occurence of errors in the field. 43-26 What standard BLM procedures for accounting use of hericides or reporting accidents would trigger a report or investigation of mistakes?

43-27 Even the critical equation for determining the probability of cancer lacks documentation. If the one hit model of cancer is assumed, why do you divide by the number of days in a person's life? Dividing by that number alone reduces the probabilities into the order of magnitudes for extremely unlikely events. Similarly, the "q" values are not well explained, and seem to be low enough to have already taken lifetime averages into account. Is the equation used in DEIS generally accepted by the scientific community? By the EPA: Where did it come from?

The DEIS fails to analyze the efficacy of the program and its alternatives.

43-28 The DEIS includes maps which portray the menacing advance of some noxious weeds. It does not describe past attempts to eradicate or control those leafy invasions. This is essential information to a reasoned decision. Which plants are most susceptible to which chemicals? What is the scientific basis for chemical efficacy? Have claims of efficacy been verified by sources independent of the manufacturers?

43-29 Have past attempts focused on eradication or control? How successful have these different approaches been?

43-30 What is the basis for claiming that "manual and mechanical methods are much less effective and efficient" (page 40)?

43-31 Are grass monocultures ever a stable system? How much maintenance do they require to remain free of other plant types?

43-32 What losses in wildlife habitat result from loss of species diversity as target and non-target plants are removed?

43-33 To what extent, if any, is the program aimed at brush control? Would the "Trac-Mac" be preferable for brush removal purposes?

43-34 The DEIS is based on documents which are difficult for the public to examine. In response to our request for copies of personal communications and unpublished studies, for example, the BLM stated that over 200 pages of documents, available only in Portland, Oregon, would entail a duplicating cost of over $200.

We are currently attempting to find a more reasonable way to examine these background documents, and will submit comments when they have been made available to us. We hope that the BLM will keep the record open for public comment until that time.

43-35 Judging from a simple review of the references, most studies of herbicide effects are drawn from Dow Chemical Company. Do these studies meet the EPA's standards for credible research? Are their results final or preliminary?

43-36 Two studies cited in the text are not listed in the references. Would you please identify Woodward (1979) and Yates (1978)? No references are used in the discussion of glyphosates behavior in soils.

The discussion of herbicides and herbicide critics is biased.

Several of the phrases used to describe herbicide skeptics are far from objective, and rather insulting: "perception (emphasis added) of scientific uncertainty about the existence of health risks... (page 32) "those... who associate helicopters with military activities... (page 47)". Scientfic uncertainties have been established and upheld in the highest courts in America, based on well documented gaps in basic data.

43-37 When the EPA's registration process is described on page 12, no mention is made of the fact that none of the herbicides has met the 1972 EPA standards for chronic effects testing. Safety, instead of risk/benefit analysis is an implied standard.

The section on "Impacts on Human Health" attempts to discredit every positive study of health effects, and to argue that no evidence means no problem. It's a travesty of logic to maintain that chemicals are innocent until proven guilty, when a rational, prospective system for evaluating both efficacy and safety is well within the current limits of technology.

There is little explanation of the need for this program, and some questionable assumptions about legal constraints.

43-38 The purpose of the program is described broadly, without meaningful quantification. It's implied that the BLM must eradicate to live up to the law, but PL 93-629 offers the Secretary options to "cooperate... to eradicate, suppress, control, or prevent or retard the spread of any noxious weed." Eradication and control are quite different goals, though not compared in the DEIS.

43-39 Furthermore, the discussion in the text of poisonous plants raises some legal questions, since many are native plants. PL 93-629 defines noxious weed to plants of foreign origin.

Air quality. Perhaps the most important omission in the air quality section is a discussion of the volitalization of 2,4-D. Robinson and Fox (1970) report that the average 2,4-D concentration in the air in seven towns in south central Washington was 0.31 mg/3.' A number of authors have shown that volatilization can occur days after application (Nash, 1983; Taylor, 1978; Leonard, 1961). Thompson (1983) cites a study in Austria which showed that as much as 75% of spray damage could be ascribed to revolitalization, rather then drift.

43-40 The document should discuss volitalization and revolitalization as it could apply to the weed control areas.

43-41 Claiming that overall air quality is good is too broad, and does not account for areas like Medford, Oregon. Will later EA's address air quality on a site-specific basis?

43-42 What is the rate of accidental drift, a subject which has been studied? The 1% drift figure cited on page 34 is based on 5 mph winds, which is a different standard from the design features in Appendix I. The design features ought to require the use of spray monitoring cards or other monitoring devices, and a plan for publishing results of monitoring efforts.

43-43 Water quality. Analysis of the impacts of herbicides on water quality is very weak. Groundwater impacts are not discussed with any supporting data. What is the rate of background contamination in ground water? What effects can we expect from continued use of picloram, which is persistant and already shows up in streamflow? Studies like those of Norris (1969) found 2,4-D in standing water 23 days after spraying, and the implications for precautions in application should not be overlooked.

43-44 The text implies that herbicide contamination of surface water is acceptable: "Often no effort is made to exclude aerial spraying across ephemeral stream channels." "Aerial application of a mixture of picloram... and 2,4-D ... resulted in detectable levels of picloram in runoff for 30.5 months." Such statements are grounds for a hard look at the cumulative impacts of spraying programs, which this document lacks. In fact, given that monitoring efforts will vary from district to district, it's unlikely that the effects of even this program will be evaluated.

43-45 Soil Impacts. The soil section is limited by its lack of treatment of the effects of leaching, particularly of 2,4-D.

43-46 Picloram build-up is potentially serious due to arid conditions. Would it be restricted from use in the drier areas of the five state program due to its persistance in dry soils?

43-47 What are the impacts on soil fertility when nitrogen-fixing weeds are removed? Are the weed invasions correlated with increases in low fertility soils or erosion of topsoil? How does the compaction resulting from heavy grazing use effect plant populations, including the distribution of weeds?

Vegetation and Grazing. Although purportedly the subject of this document, little except the superficial is siad about plants and plant communities.

43-48 This document fails to discuss the grazing history of the EIS area, an enormous omission. Without a realistic discussion of past errors and an assessment of the current situation in light of those problems, a rational decision is impossible. Please include consideration of Denzel Ferguson's Sacred Cows at the Public Trough in your next discussion of vegetation management, as well as other studies and scholarly works which analyze western range problems.

43-49 Again, we wish we had had the opportunity to raise these broad issues during a scoping phase. To begin such a discussion, we enclose a few pages from Dr. Ferguson's book, which we ask to be included in the public record.

43-50 Given the extent of deteriorated rangeland identified in the RPA process, treating 25,000 acres for weeds seems a bit like applying a band-aid to gangrene. What effects will the new fences and rest-rotation systems have on weeds? How long do areas need to be withdrawn from grazing to optimise the impacts of weed control projects?

43-51 Do cattle and wildlife have conflicting vegetation needs? If so, how are they balanced? Are noxious weeds defined in terms of wildlife or cattle?

43-52 Wildlife and livestock. In general, the discussion of wildlife impacts is very weak, and unsupported by data. What is the range of "varying degrees" of impacts on wildlife from loss of nontarget vegetation? Shifting from diverse plant communities to grass monocultures is potentially devastating, and deserves real consideration.

43-53 Herbicide impacts on wildlife are largely not described in the DEIS. If no data is available, that scientific uncertainty must be disclosed and remedied. The Herbicide Background Statement documents that no studies on picloram effects on wildlife have been conducted (page P-16).

43-54 Since 2,4-D is a plant hormone, similar in structure to serotonin (Wooley, 1957), its wildlife impacts could be very important, and need to be discussed.

43-55 Some impacts would be similar for wild mammals and domestic grazers. For example, Morton (1967) found an appreciable residual of 2,4-D in grass four weeks after application. What will the impacts on wild mammals be? How will permittees know to restrict grazing for a full 30 days before slaughter?

This entire document needs to be replaced with a more thorough presentation of alternatives. We look forward to reviewing a new draft, before any final decision is reached. We ask to be kept informed of the status of the project, and to be included in any additional scoping or other forms of public involvement.

Thank you for your consideration of our comments and questions.

Sincerely,

Marie Reeder
SOLCAP Coordinator

RESPONSE TO COMMENT LETTER 43

43-1 Net benefits were not measured in this EIS.

43-2 As stated on page 11 of the DEIS, this EIS is intended to guide the program for the next 10-15 years. Table 1-2 on page 6 of the DEIS shows what the average annual program would be, assuming BLM obtains adequate funding.

43-3 Because of the problems of accurately predicting future costs and benefits, certain assumptions were made. For purposes of analysis, costs and benefits were assumed to remain the same over time.

43-4 Information was not available to measure the impact of weed control on employment and local personal income in the EIS area. However, jobs and local personal income would be generated through such activities (helicopter and ground crews), through expenditures for supplies, fuel, food, and lodging, and the related chain reaction of spending throughout the economy.

43-5 The assumptions in the worst-case analysis of crew size and numbers of crews needed to treat the proposed acreages should not be related to job opportunities created by the program. Local job opportunities would be directly related to acres to be treated by a specific method in a locale. The 6,700 acre figure cited is an extraordinary case, built into the worst-case analysis for conservatism to maximize the number of crew exposure days. The proposed action includes the proposed treatment of only 5,900 acres aerially over the EIS area.

43-6 During the past 2 years, the injunction in the Ninth Circuit Court has prevented BLM in Oregon, Washington, and Idaho from controlling noxious weeds using what is often the most effective and efficient means--herbicides. As a result, many noxious weeds have continued to spread unchecked, and more money will be needed to carry out a weed control program. Cost estimates have been revised.

43-7 About $463,000 was budgeted for weed control on BLM land in the EIS area in 1984. None of this money was used for spraying herbicides in Idaho, Oregon, or Washington, where only biological, manual, and mechanical methods of weed control were used in 1984. BLM paid the State of Oregon $70,000 in fiscal year 1984 to pursue biological control of noxious weeds on BLM land. About $220,000 was spent on the herbicide program in the EIS area, all in Montana and Wyoming. Because BLM's weed control program was not fully functional in 1984, the year 1984 should not be used as a standard.

43-8 Although no personal invitations to participate in scoping were issued to any interest groups, an extensive effort was made to invite the public to participate in scoping. In addition to the publication of a Notice of Intent in the Federal Register on February 20, 1985, a news release was drafted and sent throughout the EIS area. Of the news media that serve southwest Oregon, the following received the news release:

- 3 wire services
- 18 television and radio stations
- 30 daily newspapers
- 46 weekly newspapers
- 20 periodicals

43-9 The Proposed Action (Alternative 1) is an integrated pest management alternative. See response to common issue 1.

43-10 Heavy grazing is one of the factors that can contribute to weed problems. See response 43-47, paragraph 2. Many variables are involved in establishing a threshold level for weed infestation, only one of which is grazing management. Continued heavy grazing can result in greater weed problems.

43-11 There has been no indication that weeds invade more readily into stands of either native or non-native grasses.

43-12 Once noxious weeds become established, it is very difficult to totally eradicate them, however they can be controlled. When newly infested noxious weed areas are treated with two or three follow up treatments before the weeds flower during the first year, weeds in these areas can be eradicated. Annuals, biennials, and simple perennials are most susceptible to eradication. See response to common issue 7 on spread of weeds.

43-13 Not enough data exists on which to base an estimate of the cost of implementing livestock management policies aimed at reducing the spread of weeds. The greatest avenues for the spread of weeds are highways, railroads, rights-of-ways, and waterways. See common issue 5 on monitoring. Also, see response 43-47 paragraph 2.

43-14 The purpose of this programmatic EIS is to address the impacts on the environment of implementing a weed control and eradication program. The program is needed because noxious weeds have already infested or taken over a great deal of land. BLM is concerned with avenues of introduction and spread and considers these concerns when conducting other activities such as road building. Also see response to common issue 7.

43-15 See response to comment 59-26.

43-16 Recognizing that IBT studies are not applicable, BLM did not include conclusions based on IBT data. The chronic effects of glyphosate are presented in Appendix K.

EPA has determined that N-Nitrosoglyphosate (NNG) does not occur as a contaminant in significant amounts in glyphosate to pose a hazard to human health (Dost 1983).

43-17 Dicamba is registered with EPA (EPA Reg. No. 87625-AA).

43-18 Base case doses from Table H-4 are multiplied by application rates listed in Table H-3 to produce occupational exposure dosages in Table H-5.

43-19 The 635 acres expected to be treated by hand application (shown in Table H-1) is a total for all five states. Hence, 8 acres/crew/day x 4 crews/state x 5 states = 160 acres treated per crew day. A total of 635 acres divided by 160 acres/crew day = 3.96 total crew exposure days (the number of days any one crew would be exposed to herbicides under the proposed program). The reason Table H-1 gives 5 crew exposure days instead of 4 is that crew exposure days were calculated by chemical (not a combined total), and at least 1 crew exposure day was assumed for a conservative estimate.

43-20 Your comment refers to an editorial error. The statement has been changed to read, "displaced by a less conservative multistage model." The multistage model is often selected over the one-hit model because it more realistically considers a dose-response relationship among carcinogens.

43-21 The assumption of one crew per state is conservative because the realistic situation would be that two or more crews would be spraying in the states of Idaho, Montana, and Wyoming and possibly in Washington. Using the assumption of one crew per state creates more crew exposure days. Although one crew could treat the total aerial acreage proposed for a season, it would be logistically impossible to do so over the five state area.

43-22 Accidental exposure scenarios have been included in the worst-case analysis, see revised Appendix H.

43-23 Cumulative effects are addressed in the worst-case analysis. The probabilities are presented for carcinogenic effects of chemicals used in combination, as well as multiple exposures (occupationally and to the public) over a life-time. The probability calculations assume exposure at full strength not allowing for degradation or dilution, providing the opportunity for greatest chemical accumulation in an individual.

43-24 The section dealing with herbicide concentrations in deer muscles has been corrected and referenced. Because the conclusion from the data is that no concentration of the chemical was found in the muscle tissue, the worst-case analysis assumed that the lowest detectable level would occur (Dost 1983).

43-25 Because the average size of the adolescent is smaller than that of the comparable adult, stomach capacity is normally smaller. Two liters (more than a half gallon) is probably an overestimate of the adult intake.

43-26 Standard procedures for herbicide use are provided in BLM Manual Section 9222 as cited.

43-27 The explanation of the probability equation has been revised and references added (see revised Appendix H). The number of days in a person's life-time is important in determining dose/time equivalency, thereby enabling projected human exposure to be fitted to animal test data of cancer potency.

43-28 See response to comment 44-2. The best result of a cooperative leafy spurge control program has been in the State of Wyoming. The Wyoming State Department of Agriculture, Weed and Pest Control Division and the University of Wyoming have facts and figures to show how their program is working.

43-29 See responses to comments 43-12 and 44-2.

43-30 Manual and mechanical methods are only effective for annuals, biennials, and simple perennials. Repeated measures must be continued throughout the growing season. Manual and mechanical methods can reduce the number of seeds produced per plant on creeping perennials, but some manual and mechanical methods also aid in the spread of these creeping perennials by moving the plant roots and rhizomes.

43-31 Natural grass monocultures can remain fairly stable under "natural" conditions. Introduced grass monocultures, such as crested wheat seedings, in most cases, are not stable in that they will usually revert over time, unless maintained by grazing or land treatment (fire, spraying, chaining, etc). The amount of maintenance needed depends on many factors, including: intensity and duration of grazing by both livestock and wildlife, soil type, climatic conditions and fire occurrence.

43-32 See responses to comments 21-3 and 29-2.

43-33 This EIS was prepared for noxious weed control. No attempt was made to address brush control.

43-34 The information request referenced was a Freedom of Information Act request for 35 documents, which included 27 published documents, 5 unpublished reports, and 3 personal communications. The total number of pages was estimated to exceed 2,000. As outlined in the Freedom of Information Act, user fees will be charged for document search and duplication costs incurred in responding to requests for records. BLM must charge for reproducing documents that can be obtained through other sources (authors or publishers) at a fee. BLM's duplication charge is 10 cents per page, hence the $200 estimate.

43-35 Two references pertaining to herbicide effects are from Dow Chemical Company. These studies are complete and result from credible research.

43-36 The references have been included in the FEIS.

43-37 All herbicides proposed for use are registered and have met standards set at the time of registration.

43-38 See response to comments 15-1 and 45-3, paragraph 1.

43-39 See response to comment 7-1.

43-40 Volitalization was discussed briefly in the DEIS on page 34. More analysis has been added, see text revisions.

43-41 Site-specific analysis and appropriate documentation will further address air quality. Also refer to response 71-14.

43-42 The 6 miles per hour figure in Appendix I of the DEIS was a misprint. The text in Appendix I has been revised to 5 miles per hour. Also see the description of chemical methods in Chapter 1.

43-43 BLM has no knowledge of any studies or reports where the effort was directed only toward measuring the amount of background herbicides in ground water. All studies found address ground water in relation to a specific application project. These studies begin with zero amount of herbicide present and, if herbicide becomes detectable, they sample until it again reaches the undetectable or beginning level. If these studies are taken at face value, it must be assumed that the background level of herbicides was zero or at least undetectable.

43-44 See response to comment 44-22 concerning ephemeral stream channels.

43-45 Further discussion on the leaching of herbicides in soil can be found in Appendix K of the DEIS as follows:

Dicamba	p. 107
2,4-D	p. 109
Picloram	p. 113
Glyphosate	p. 115

43-46 As stated on page 35 of the DEIS, picloram is moderately to highly persistent in soil. The literature analysis suggests that picloram persists longer in arid climates. The proposed application rates are low (not to exceed 1 lb/acre). In the more arid portions of the EIS area, application rates would probably be closer to 1/2 lb/acre. Although BLM does not plan to restrict picloram's use in drier areas, to reduce the potential for picloram accumulation in the soil BLM would allow no more than one application per site in any given year. (See revised project design features and text revisions in the Soil Impacts section of Chapter 3.)

43-47 Of all the noxious weeds discussed in the EIS, only the legumes are classed as nitrogen fixers. Most of the noxious weeds are not legumes. The competitive ability of nitrogen fixing weeds would overshadow any benefit from nitrogen fixitation.

Weed invasions cannot be correlated with increases in low fertility soils or erosion of topsoil. Although low fertility soils and erosion may make a particular site more susceptible to invasion by noxious weeds, weed problems don't occur only in such areas or just because these conditions exist.

Most soil compaction resulting from livestock grazing occurs where livestock naturally congregate: drainage bottoms, shady areas, water sources. Heavy grazing can contribute to the noxious weed problem by reducing desirable vegetation, allowing noxious weeds to better compete. One cannot say that noxious weeds occur as a result of or only in areas that are heavily grazed by livestock. Noxious weeds occur in forest land, good condition rangeland, and areas ungrazed by livestock.

43-48 Although grazing practices may affect the spread of noxious weeds, a discussion of the grazing history of the EIS area is beyond the scope of this EIS.

43-49 All letters received, including attachments, will remain a part of the public record for this EIS.

43-50 The effects of new fences and rest rotation grazing vary from one situation or area to the next and will thus be addressed during site-specific analyses and documentation. Grazing restrictions will comply with EPA registration requirements.

43-51 During certain times of the year, both livestock and some wildlife species use grasses. Where this competition exists the needs are balanced during the land use (Resource Management Planning) process. For a definition of noxious weeds, see response to comment 7-1.

43-52 See response to comment 29-2.

43-53 See response to comments 21-3, 29-2, and 33-1.

43-54 See response to comment 31-13.

43-55 See response to comment 31-13.

Natural Resources Defense Council, Inc.

25 KEARNY STREET
SAN FRANCISCO, CALIFORNIA 94108
415 421-6561

Washington Office
1350 NEW YORK AVENUE, N.W.
SUITE 300
WASHINGTON, D.C. [illegible]
202 783-7800

New York Office
122 EAST 42ND STREET
NEW YORK, N.Y. 10168
212 949-0049

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COMMENTS OF THE

NATURAL RESOURCES DEFENSE COUNCIL, INC.

ON THE

BUREAU OF LAND MANAGEMENT DRAFT ENVIRONMENTAL IMPACT STATEMENT:

NORTHWEST AREA NOXIOUS WEED CONTROL PROGRAM

(May 1985)

Prepared by:

Heather L. MacDonald
with David B. Edelson

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New England Office: 850 BOSTON POST ROAD • SUDBURY, MA 01776 • 617 237-0472
Public Lands Institute: 1720 RACE STREET • DENVER, CO. 80206 • 303 377-9740

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The following comments on the Bureau of Land Management's (BLM) Draft Environmental Impact Statement (DES) for the proposed Northwest Area Noxious Weed Control Program (May 1985) are submitted by the Natural Resources Defense Council (NRDC). The NRDC is a nonprofit organization with 48,000 members nationwide, dedicated to protecting America's natural resources and to improving the quality of the human environment. NRDC has a longstanding commitment to achieving more environmentally sound management of the public lands. In addition, we have actively sought to enforce and improve the nation's pesticide control laws.

I. Summary.

NRDC strongly opposes BLM's proposed Northwest Area Noxious Weed Control Program for two basic reasons. First, the DES is seriously deficient as a decision-making document, and cannot, therefore, serve as the basis for an agency decision to proceed with the proposed herbicide spraying program. Second, the costs of the program, both environmental and fiscal, far outweigh its meager benefits. We urge BLM to reconsider the need for such a massive program and to pay serious attention to non-chemical alternatives in a revised DES.

The inadequacies of the DES's analysis of the program (enumerated below) and its failure to justify herbicide spraying in either environmental or economic terms indicate that BLM has already determined to implement the proposed herbicide spraying program, regardless of the environmental impacts revealed by the National Environmental Policy Act (NEPA) decision-making process.

Such a method of decision-making violates NEPA's mandate that environmental analysis provide the basis, rather than post hoc justification, for agency action. 42 U.S.C. § 4332(2); 40 C.F.R. §§ 1501.1(a), 1502.1 and 1502.2(g).

NRDC's comments will address the following areas of concern:

. The DES fails to establish the need for, or the cost-efficiency of, the herbicide spraying program.

. The DES does not adequately specify the program's features.

. The DES's discussion of the adverse environmental effects of the program is deficient and its discussion of the program's benefits specious.

. The DES dismisses the viability of non-chemical alternatives to the program without serious analysis and on wholly fallacious grounds.

. The DES violates NEPA's requirements for the analysis of actions proposed in the context of scientific uncertainty ("worst case analysis").

. The DES violates the formal requirements for EISs.

Many of the above-mentioned deficiencies in the DES not only demonstrate the inadequacies of BLM's decision-making process, they also violate the public's right to comment on the proposed agency action. The inadequate specification of the program's features impedes the public's ability to comment in detail on the program and its environmental consequences. The failure to "rigorously explore and objectively evaluate all reasonable alternatives" to herbicide spraying denies the public its right to assess the need for the proposed action in light of possible alternatives to such spraying. 40 C.F.R. § 1502.14(a).

NRDC recommends that as an initial matter, BLM prepare an EIS on the proposed herbicide spraying program that corrects the deficiencies discussed below. In particular, BLM should evaluate the cost-efficiency of the program, thoroughly analyze the environmental consequences of herbicide-spraying on the EIS area, to the extent that those consequences are known, and disclose its inability to guarantee to the public the safety of its program, to the extent that the consequences are not known.

NRDC objects to the herbicide spraying program itself, as well as to the manner in which it has been analyzed. NRDC opposes the program on two grounds. First, it cannot be justified as cost-efficient. According to BLM's own data, the program will cost nearly a million and a half dollars each year to gain several thousand dollars of revenues from increased animal unit months (AUMs), and to avoid, at most, several thousand dollars of loss from noxious weeds. Second, NRDC believes that the further introduction of herbicides into the environment poses a great, and, as indicated above, unnecessary danger to human health and to the natural environment. NRDC maintains that no safe level of exposure exists for known or suspected carcinogens. The extrapolation from animal tests of toxic chemicals to human beings contains too many uncertainties and rests on assumptions too poorly grounded to provide assurance that such chemicals are safe for human beings. Moreover, the chemicals in question lack reliable data as to their safety even for animals. Their testing

either has been invalidated or is incomplete. Rather than adopting a wait-and-see approach to the use of chemicals whose effects on human beings and other species will not be fully manifest for many years, BLM should suspend their use until their safety has been definitively established. Safe and commercially-viable non-toxic methods of weed control exist. BLM should utilize current methods of physical and biological weed control on public lands, develop even more effective non-chemical treatments and encourage their use on state and private lands.

II. BLM Has Not Established the Need for Pesticide Spraying.

A. The DES Does Not Establish the Extent or the Seriousness of the Noxious Weed Problem on Public Lands.

The DES does not establish the extent or the seriousness of the purported noxious weed problem on public lands. Table 1-1 shows the acres "[a]ffected by [n]oxious [w]eeds in the EIS [a]rea." DES at 2. The DES does not, however, define "affected 44-1 by." It does not disclose the ratio of noxious weeds to other plant species on the "affected" lands, nor the significance of those ratios. The DES claims that noxious weeds "are rapidly 44-2 spreading." *Id.* Yet its only documentation of that spread spans a single sixty-year period from 1920 to 1980, and does not differentiate public from non-public lands. Figs. D-1-D-4, DES at 74-77. Such a gross statistical sampling is inadequate to substantiate the claim that weeds are rapidly spreading on public 44-3 lands. A table on the effect of the proposed program on forage gives an annual 13% rate of spread, without substantiating that figure. Table 3-3, *id.* at 46. Appendix C-1 lists average annual

percentages of spread of the targeted species, based on "personal communications" with weed scientists. *Id.* at 70. "Personal communications" do not constitute a valid source of scientific data, since the methodology used to generate the data remains unknown and, hence, unverifiable.

BLM's failure to provide adequate documentation of the claimed rapid spread of noxious weeds on public lands is perplexing since it ought to have kept records of changes in the weed population in its prior efforts at weed control.

Even if the claimed spread of noxious weeds is in fact occurring, the pertinent question is why the lands in the EIS area are so susceptible to weeds. Weed infestation suggests that the native ecosystem has been weakened, since healthy ecosystems are weed-resistant. The over-grazing of lands in the EIS area has 44-4 likely weakened their ability to resist exotic weeds. BLM should address the cause of the noxious weed problem -- excessive grazing of public lands -- rather than responding solely to the problem's symptoms, at great public expense. Unless BLM changes its management policies that are responsible for the weed infestation problem, a noxious weed control program is doomed to failure, and the revenues spent on that program will have been wasted.

The DES claims that "[e]conomic loss from noxious weeds...runs into the millions of dollars annually in each state 44-5 in the EIS area." *Id.* at 2. Besides being undocumented, this claim is irrelevant to the proposed action, since spraying is proposed for BLM, not state, lands. The DES provides no data on the economic loss on public lands from noxious weeds. It offers

the wholly unjustified figure of $361,000 of loss on the EIS area over the next ten years by calculating the loss per acre on (presumably state) lands in Washington, and by multiplying that 44-6 sum by an undisclosed amount. This methodology is unacceptable not only because it fails to explicate the figures used, but also because the loss per acre from noxious weeds in Washington is certainly different from the loss per acre over the EIS area, due to the great variations across ecosystems and to differences in treatment programs.

To evaluate the need for the proposed actions, the decision-maker and the public need to know not only the extent and the seriousness of the noxious weed "problem," but also how that problem compares to others affecting public lands. BLM should compare, for example, the impact of noxious weeds on rangeland productivity to the widely-documented overgrazing problem. The Bureau's funds would be better spent by improving range management or implementing cost-effective range improvements. Unless the decision-maker and the public are informed about the comparative impact of noxious weeds, they cannot evaluate the efficiency of revenues spent controlling those weeds.

B. The DES Does Not Establish the Efficacy of Herbicide Spraying.

Despite the fact that herbicides have been sprayed for years on public, as well as state and private, lands, the DES provides no documentation of the success rate of previous herbicide 44-7 programs. "In 1982 and 1983, an average of 172,717 weed-infested acres were annually treated on BLM lands." *Id.* at 21. Had these treatments been successful, one would expect BLM to say so, with proof. Table 3-3 claims that ten years of herbicide treatment will totally eradicate noxious weeds on the treated acres. 44-8 This assertion is preposterous, and totally unsubstantiated. Id. at 46. Appendix E lists the susceptibility of common weeds to the herbicides proposed for use, but provides no source for its data. Id. at 79-89. BLM's failure to discuss the efficacy of its previous herbicide programs strongly suggests that such programs were not successful in controlling weeds. Such a suggestion is corroborated by the purported uncontrolled spread of noxious weeds. The two claims are inconsistent: either herbicide spraying does not effectively control weeds or their spread is not in fact out of control.

Until BLM provides proof of the effectiveness of herbicides in controlling noxious weeds, the decision-maker and the public cannot evaluate the need for the proposed program.

44-9

C. The DES Does Not Anlayze the Cost-Effectiveness of the Proposed Action, but its Data Strongly Suggest that the Action is Not Cost-Justified.

The DES does not compare the costs of the herbicide-spraying program to the avoided costs and the expected benefits. Such an analysis is essential to an informed and rational evaluation of the need for the program, as is demonstrated below. Table 3-3 lists maximum forage increases on acres treated under the four alternatives.[1] Id. at 46. Alternative 1 will yield 2,950 AUMs (presumably, over a ten-year period, in accord with the other categories). BLM presently receives $1.35/AUM. The program will therefore yield $3,982.50 (not adjusting for inflation) from increased AUMs. The DES states that "one could calculate that in 10 years the economic loss from untreated BLM lands in the EIS area would amount to $361,000."[2] Id. at 46. The DES does not explain whether this figure includes foregone AUMs on lands currently held out of livestock production. If it does include foregone AUMs, it includes the $3,982.50 derived from Table 3-3. As a conservative estimate, however, we assume that the revenues from increased AUMs are not included in the $361,000. The maximum benefits to be derived from Alternative 1 are therefore $364,982.50. The program will cost $13,980,000 over ten years. Table 3-3, id. at 46. The costs of the program thus outweigh its benefits by a ratio of roughly 38 to 1. The program is grossly cost-inefficient and should therefore be abandoned.

The comparison of the costs of the various alternatives considered in the DES is methodologically inadequate. Appendix J lists the alternative treatment costs per acre. Id. at 105. The figures are unexplained and thus cannot be accepted without an indication of their component parts. The Appendix states that the "costs for Alternative 3 were calculated under the assumption that mechanical, manual, and biological measures could not, by themselves, adequately control the noxious weed infestation that would be treated under Alternative 1." Id. Putting aside for one moment the legitimacy of this assumption, and the failure to define "adequacy of control," this statement presumably means that the costs for Alternative 3 are based on multiple treatments, whereas the costs for Alternative 1 are not. Yet herbicide treatments also must be repeated "in some situations." Id. at 7. 44-10 The comparison of the costs of two treatments, even assuming the accuracy of the cost estimates (disputed below), is therefore misleading.

The economic case for herbicide spraying has been challenged by experts both inside and outside the government, on the grounds that 1) the agencies utilizing herbicides do not systematically monitor their costs, thus rendering their cost estimates speculative, and 2) the cost estimates exlude major direct and indirect costs of spraying. Dr. Jan Newton testified before the Subcommittee on Forests of the House Agricultural Committee that "there is insufficient evidence to justify herbicide use on economic grounds. In fact, the necessary evidence or documentation for an economic case is almost entirely nonexistent." Hearing on Phenoxy Herbicides in Forest Management: Efficacy and Environmental Effects Before the Subcomm. on Forests of the House Comm. on Agriculture, 96th Cong., 2d Sess. 4 (1980). The General Accounting Office (GAO) supports Dr. Newton's conclusions. A GAO Report discussing Forest Service and BLM selection of vegetation management alternatives found that the agencies generally did not undertake detailed cost comparison or analysis nor keep records to track the indirect costs associated with the various vegetation management practices. U. S. Gen. Accounting Office, Better Data Needed to Determine the Extent to which Herbicides Should Be Used on Forest Lands (Apr. 17, 1981) (GAO/RCED-81-46) ("GAO, Better Data Needed"). Even though definitive cost analysis for the study was not possible, the data GAO obtained indicated that aerial herbicide spraying may not have as much of an economic advantage over other methods as is generally supposed. The GAO found that the cost differential among the methods appears to have narrowed considerably since 1975, which could reduce the importance of budgetary outlays as an issue when deciding among methods of weed control. Id.

The cost estimates in the DES, on BLM's own admission, are 44-11 inaccurate. They do not include the costs of "EIS preparation, litigation, accidents, and training." Id. at 105. These unincluded costs are much higher for herbicide treatments than for physical and biological treatments. Were an adequate EIS on herbicide spraying to be prepared, it would have to cover a far greater range of impacts and risks than would an EIS on non-chemical treatment, and would thus be far costlier to prepare. Herbicide spraying has already spawned a rash of litigation in the Northwest; non-herbicide treatments have not. The environmental, health and lost productivity costs from toxic chemical accidents are much greater than the costs of accidents in non-chemical treatments. The training of herbicide applicators ought to be more extensive, and hence, more costly, than the training for manual workers, since herbicide spraying entails a severe

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[1] The figures assume that "no livestock graze noxious weed-infested land." Id. This assumption contradicts the assumption underlying the claimed economic losses from the poisoning of livestock grazing on noxious weeds. See id. at 42.

[2] One ought not to so calculate, however, since the extrapolation from losses on Washington lands to losses on BLM lands is illegitimate. See supra at 6. It is not clear how BLM derived the sum of $361,000 from $4.33 per acre.

environmental hazard. Herbicide treatment also incurs unique
regulatory costs: The government must register the herbicides,
license the applicators, and monitor the treatment. Since the
44-12 basis for the cost estimates for helicopter treatment remains
hidden, we do not know whether it includes stand-by or downtime of
the helicopter, for which applicators are paid. The estimates
44-13 should also include the costs of demarcating and fencing off
buffer zones.

Another major category of costs excluded from the analysis is
the cost of the loss of non-target species, both plant and animal.
Since the herbicides will kill the plants that provide wildlife
habitat, *id.* at 38, if not the wildlife itself, wildlife will
44-14 decrease in numbers, resulting in a loss of recreational and
scenic values as well as a decrease in hunting revenues.

Additionally, the costs of caring for workers and members of the public exposed either routinely or catastrophically to toxic chemicals may be astronomical over a lifetime.

D. *Conclusion*.

The DES fails to establish the need for the herbicide-spraying program, since it has not shown the seriousness of the weed "problem" or the efficacy of its proposed solution. BLM's own cost figures (which are of questionable validity) indicate that the costs of the program far outweigh any possible benefits. The comparative analysis of costs of the alternatives is without value, since it does not disclose its basis and excludes major categories of costs from the analysis of Alternative 1. NRDC recommends that BLM document the weed "problem" on the public lands, that it provide verifiable data on the success rates of herbicide spraying, and that it reanalyze in the necessary detail the costs of herbicide spraying, taking into account, at the minimum, the cost categories outlined above.

III. *The Herbicide-Spraying Program Is Inadequately Specified*.

The DES does not adequately describe the proposed action,
thus disabling reviewers from commenting on its specific features
and environmental consequences. The fate of herbicides in the
environment is intimately linked to the types of soil, location of
water, and weather conditions where they are used. The DES
acknowledges that the EIS area comprises a wide variety of
ecosystems, but does not begin to specify which herbicides will be
used where, nor in what amounts. It states merely that "[s]ome
acres may receive one or more treatments in combination [and that]
[t]reatment would occasionally have to be repeated in some
situations, whereas in others a single treatment would suffice."
Id. at 7. This statement provides no basis for estimating how the
different areas of the proposed action will be affected by that
action. The DES leaves the decision as to herbicide use on
specific tracts of land to surveys conducted under BLM Manual
9222. *Id.* at 7. The DES does not suggest that the public will be
allowed to participate in or comment on the "pretreatment surveys"
44-15 (*id.*) or the site-specific environmental analyses (*id.* at 11, 14).
The public is thus excluded from the most crucial decisions under
the program: whether and where to spray.

BLM's policy with regard to spraying in wilderness study
areas is "to carry out a control program...when no effective
alternatives to noxious weed control exist..., but only in small
areas." *Id.* at 7. The DES does not specify what BLM considers to
44-16 be an "effective alternative," nor what constitutes a "small
area[]."

The DES states that "spot treatments would be applied at any
time [to livestock pastures], regardless of the presence of
livestock." *Id.* at 42. NRDC opposes the application of any
amount of herbicides to pastures in which livestock are grazing,
44-17 but also objects to BLM's failure to specify what amount
constitutes a "spot treatment." The mitigation measures appear to
be offered more as a precatory suggestion than as an actual
feature of Alternative 1: "[L]ivestock...*should be* confined to a
small area for several days...[w]hen moved from a weed-infested
pasture to a weed-free pasture....Adequate distances *need to be*
provided between feeding areas...and water sources, riparian
areas, and wooded areas....Holding pastures and feeding areas
ought to be observed closely, and problem infestations treated
rapidly." *Id.* at 8 (emphasis added). Not only does the DES not
specify what "adequate distances" are, what constitutes close
observation or rapid treatment, or why "several days" is an
adequate quarantine period, it also does not commit BLM to
undertaking any of these measures, but merely suggests that they
ought to be undertaken.

NRDC recommends that BLM specify the sites that would be
sprayed with herbicides under Alternatives 1 and 2, and provide a
more exact description of the intended mitigation measures, in
order to allow the public to comment on the exact features of the
program. At a minimum, the Bureau should commit itself to
44-18 preparing site-specific EISs with full opportunity for public
comment before authorizing spraying in a particular area.

The DES relies on state standards for establishing buffer
44-19 strips around aquifers. DES at 102. BLM should analyze whether
these standards provide adequate protection against water
contamination. Many buffer zones are irrelevant to the real world
of hydrogeology. It is possible to identify areas around aquifers
where infiltrating water is likely to reach the groundwater.
Cones of depression -- a measured lowering of the water table to
0.1 foot -- can extend 3,000 feet from the wellhead in one
direction, a distance far greater than the typical state-mandated
buffer zone. Herbicides which land within the cone of depression
will move rapidly from the surface into the groundwater. BLM
should identify the cones of depression for all public and private
well system aquifers, and ban herbicide spraying within the
cones.

IV. *The DES Takes a Best Case Approach to the Analysis of the Environmental Effects of Herbicide Spraying that Unduly Minimizes Possible Negative Consequences and Exaggerates Possible Positive Consequences*.

The DES takes a "best case" approach to the analysis of the environmental consequences of the proposed herbicide spraying. It assumes, rather than proves, that the program will have no adverse effects, and then states its assumptions as conclusions. In the cases where the DES does state known properties of the herbicides that can lead to adverse environmental effects -- properties such as persistence in soils and mobility -- it fails to relate those general properties to the proposed action. It fails to estimate, for example, how much herbicide may be expected to remain in the soil or to reach groundwater, and what the environmental or health consequences of those occurences may be. On the other hand, the DES claims benefits from the herbicide spraying program that are either unproven or wholly fanciful. The DES thus violates NEPA's requirement of "a detailed statement...on...[t]he environmental impact of the proposed actions." 42 U.S.C. § 4332(2)(C)(i).

A. The DES Fails to Analyze the Likely Adverse Impacts of the Herbicide Spraying Program.

1. Impacts on Soils.

The DES lists several properties of the herbicides intended for use which would lead to adverse environmental consequences: "2,4-D is relatively mobile in soil compared with other herbicides....Picloram is...a mobile herbicide because its adsorption...is low....Picloram can readily move to depths greater than 3 feet, even in relatively dry areas, when the application rate is high (3 to 9 pounds/acre)....The persistence of picloram in soils is...moderate to high because it may exist at phytotoxic levels for a year or more after normal application....[Its] half-life...has been reported to range from more than 4 years in arid regions....Dicamba...has a high degree of mobility in most soils." DES at 35. The DES states conditions which mitigate the adverse environmental consequences of herbicide use without articulating the consequences when such conditions are absent: "Microbial degradation...is the major mechanism by which 2,4-D is lost from the soil, especially under warm moist conditions with high soil organic matter." Id.

44-20 The DES fails to analyze how the above-mentioned properties of the herbicides will be manifested in the EIS area, and what environmental and health consequences may follow from that manifestation. The greater part of the EIS area is arid or semi-arid. Id. at 21. Aridity of soil increases herbicide persistence and mobility. The DES does not reveal where the soil is arid in the EIS area, (cf. id. at 20), how much herbicide may be expected to remain in the soil in those regions or to percolate to groundwater, and what the environmental and health consequences of those phenomena would be. It does not analyze the cumulative effects of multiple applications of herbicides on the EIS area, both prior to and including the proposed action, which could produce application rates greater than 1 lb./acre.

The summaries in the beginning of the DES and in Table 1-4 epitomise the inadequacies of the environmental analysis of soil impacts: "The persistence of herbicides in soils would be greater in the more arid portions of the EIS area under Alternatives 1 and 2" id. at ii; "some persistence of herbicides in soil [is] more likely in arid areas." Id. at 12. Such vague, unquantified descriptions are useless to a decision-maker's or the public's assessment of the likely impacts of the proposed action.

2. Impacts on Water Resources.

44-21 The analysis of water impacts suffers from the same lack of specificity as the analysis of soil impacts. The DES summarizes some test data on herbicide residues in streams and lists the factors that influence the likelihood of an herbicide entering surface water. Id. at 36. The DES does not relate the test data and the relevant factors to the proposed action in the EIS area. Nor does it evaluate the significance of the test data. By way of contrast, an EIS on herbicide use prepared for the Massachusetts Department of Food and Agriculture states that the "few studies available suggest the potential for 2,4-D movement in run-off may be significant." Harrison Biotech, Draft Generic Environmental Impact Statement: Control of Vegetation on Utility & Railroad Rights-of-Way II-62 (January 1984)("Mass. DES").

44-22 The DES describes features of the proposed action that will result in herbicides entering surface water without quantifying that result or analyzing its significance: "Often no effort is made to exclude aerial spraying across ephemeral stream channels. In these instances rainfall may flush herbicide residuals downstream when little time has passed since spraying." DES at 37. This impact is serious and requires greater analysis.

44-23 The reason given for the DES's failure to analyze the environmental impacts of the herbicide spraying on surface water is inadequate, and in fact increases the need for analysis: "Because BLM actions consist of a [sic] extremely small (less than 1 percent) part of the overall chemical use in the EIS area, Alternatives 1 and 2 are not expected to affect the detectable background herbicide levels in those streams." Id. Although NRDC disputes BLM's judgment that a one percent increase in herbicide use does not require environmental analysis (and in any case NRDC would need to see the methodology by which BLM arrived at the "one percent" figure before accepting even the factual predicate of that judgment) NEPA requires analysis of "individually insignificant but cumulatively significant impacts." 40 C.F.R. § 1508.27(7). Since "some streams have background detectable levels of herbicides resulting from ongoing herbicide applications by state and county agencies and by private landowners," (DES at 37) the further addition of herbicides to the environment under the proposed action may well have "cumulatively significant impacts."

44-24 The DES frankly acknowledges that "[s]ince picloram, dicamba, and 2,4-D are relatively mobile herbicides, the potential exists for detectable traces to enter the groundwater." Id. It does not analyze that potential. It dismisses the possibility of groundwater contamination with overly-broad generalizations about the ability of the wet and the arid regions of the EIS area to forestall contamination. Not only may these generalizations not replace a detailed analysis of environmental impact on specific areas, but the beneficial consequences claimed for them -- no groundwater contamination in either wet or arid regions -- are disproven by the fact that "nonfederally applied herbicides on private land have been reported to enter the groundwater." Id. at 36.

3. Impacts on Vegetation.

44-25 The DES does not quantify the "loss of nontarget vegetation" anticipated under the proposed actions, nor the amount of "chemical residue [that] may be left [on plants] for varying periods." Id. It thus fails to provide the required "detailed statement...on...[a]ny adverse environmental effects which cannot be avoided should the proposal be implemented." 42 U.S.C. § 4332(2)(C)(ii). 44-26 The Summary ignores altogether the loss of nontarget vegetation, and the possible elimination of threatened and endangered plants, in violation of 40 C.F.R. § 1502.12. Id. at ii-iii.

4. Impacts on Animals.

The DES ignores completely the effects of toxic chemicals on wildlife. Wildlife risk poisoning from ingestion of chemical residues left on plants. See id. at 38. Migratory birds might return to the EIS area during spraying. Newborn deer and antelope may be dropped in residual areas. The program might upset population distribution patterns by inducing avoidance behavior in deer and antelope and by reducing the numbers of rodents and 44-27 lagomorphs. The failure of the DES to analyze any of these significant issues renders it wholly inadequate under NEPA.

5. Impacts on Fish.

The DES claims without substantiation that the herbicides proposed for use should cause no adverse impacts on fish. Id. at 44. The DES bases this claim on the assumption that "water quality would not degrade over the EIS area or locally." Id. This assumption and the conclusion drawn from it are too facile. A number of studies, ignored in the DES, have established the toxicity of the proposed herbicides to fish.[3] The DES should

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[3] Roundup is toxic to a number of fish, although the surfactant, not the glyphosate, appears to be the cause of mortality. Mass. DES at 53. Dicamba is moderately toxic to fish, depending on the species. Arthur D. Little, Inc., Environmental Construction &

44-28 discuss the documented adverse impacts of herbicides on fish, and relate the amount of herbicides that will enter surface water under the proposed action (see id. at ii and 12) to the levels that have been known to produce adverse effects.

6. Impacts on Economic Conditions.

The DES ignores all adverse economic impacts of the proposed action. These include the impact on hunting and fishing revenues from the change in wildlife populations occasioned by the loss of non-target vegetation and direct poisoning; the necessity of locating and tapping alternative sources of water for human use should existing sources become further contaminated; and the costs in lost productivity and medical care from human poisoning by 44-29 toxic chemicals. To assume away these consequences by assuming that 1) the program will be implemented without a single error; and 2) the levels of toxic chemicals contemplated for use are safe is both unrealistic and unjustified in light of the scientific uncertainty that pervades the area.

44-30 The DES also ignores the economic costs of the need for ever-greater doses and more frequent applications of herbicides as herbicide-resistant strains of weeds develop. That such resistance may already be developing is suggested by the fact that

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Maintenance Study of High-Voltage Transmission Facilities (1979), in Mass. DES at II-99. Many formulations of 2,4-D are toxic to fish. T. E. DeVaney, "Chemical Vegetation Control Manual for Fish & Wildlife: Management Programs," Bur-Sport Fisheries & WL Res., Publ. 48, USDI (1968) in Mass. DES at II-73. If the concentration of phenoxy herbicides is "sublethal but high enough to kill aquatic macrophytes, a complex series of secondary changes may occur throughout the ecosystem, [and] a number of food webs that they were part of would necessarily be affected." National Research Council of Canada, Phenoxy Herbicides. No. 16075 (1978) in Mass. DES at II-78.

previous weed control programs have apparently been unsuccessful, despite the purported effectiveness of the herbicides in controlling weeds.

7. Impacts on Human Health.

The DES concludes that the herbicides proposed for use "present no significant risk of toxicity to workers or the public when used in compliance with labels approved by the Environmental Protection Agency." Id. at iii. This conclusion is wholly unfounded, in light of existing studies on, and field experience with, the chemicals, the gaps in scientific knowledge about the chemicals, the inaccessibility to outside reviewers of data generated by the manufacturers, and the subsequent invalidation or questioning of research upon which current registration of the herbicides is based.

Critical data gaps pertaining to the carcinogenicity, mutagenicity and teratogenicity of many pesticides and herbicides exist. Congress recognized this problem and directed EPA to close these gaps in the toxicological data base through a process known as reregistration. 7 U.S.C. § 136(g). None of the herbicides contemplated for use in BPA's noxious weed program, have been 44-31 reregistered. The DES does not mention the problem of data gaps nor the reregistration process, both of which facts are essential to an evaluation of the program's risk.

The DES is silent as well about EPA's invalidation of the Industrial Bio-Test Laboratories' (IBT) toxicological data. IBT 44-32 conducted many of the studies on dicamba, picloram and glyphosate, and some of the acute studies on 2,4-D. Most of these studies

have been determined by EPA to be invalid for any purpose; few have been replaced. The status of the IBT data is also essential information for an assessment of the program.

The following subsections review the existing and missing data on the herbicides, and compare that data to claims made in the DES.

a) Dicamba

EPA's September 1983 Registration Standard for dicamba found that the available toxicity data on the chemical are insufficient to fully assess its chronic human risk, its environmental fate, or the extent to which human and nontarget organisms are exposed to it. As of issuance of the dicamba standard, no data on oncogenicity, mutagenicity, or chronic toxicity were on file. The standard requires data to be submitted on these properties. EPA does not, however, cancel or withhold registration for missing or inadequate data. Tests have also shown that the manufacture of dicamba may produce traces of dioxin.

The DES claims, in contrast to the Registration Standard, that "dicamba has been tested for mutagenicity with negative results," and that "[c]hronic feeding studies with animals have found no carcinogenicity." DES at 50. The main body of the DES cites no authority on which it bases these claims. Appendix K cites bacterial tests for mutagenicity performed from 1972 to 1981 (the majority in 1977), and a 1979 Weed Science Society of America test and a 1983 Bonneville Power Administration final environmental impact statement for the finding of no 44-33 ↓ carcinogenicity. Id. at 108. Since these tests were available to

44-33 the EPA when it issued its reregistration standard, one must assume that EPA considered them inadequate to support the conclusion that dicamba is not mutagenic or carcinogenic.

The DES also asserts, contrary to EPA's Registration Standard, that "an assessment of [the] risks [of mutagenicity and carcinogenicity] is not needed." Id.

44-34 The Registration Standard forbids the use of dicamba "in any way which contaminates irrigation ditches or water for domestic purposes." The proposed herbicide program violates that stricture, since it contemplates the spraying of ephemeral stream beds and anticipates that herbicide drift will enter water. Id. at 37, 12.

The DES's claim that dicamba "poses no significant risk of toxicity" (id. at iii) is thus ungrounded and misleading, given the absence of data on its chronic toxicity. The divergence between the Registration Standard and the DES casts doubt on the accuracy of other claims made in the statement. The failure of BLM to take the precautions with regard to water contamination required by EPA also throws into question the adequacy of the program's other mitigation measures.

b) Glyphosate

The California State Water Resources Control Board determined in May 1984 that "a thorough assessment of the risks to aquatic life and human health cannot be completed until [certain] 'generic' issues [regarding information about herbicides] have been resolved." D. Corcoran et al., Glyphosate Use in Forestry (Roundup) and Aquatic Weed Control (Rodeo): A Water Quality

Assessment at viii (May 1984). At the same time, however, the Board approved the use of glyphosate. The "'generic' issues" impeding thorough risk assessment of toxic chemicals are "the trade secret designation of toxicological data,...the identity and toxicity of 'inert' ingredients in the registered formulations, and...a scarcity of environmental monitoring data because of analytical procedure difficulties." Id. When glyphosate was submitted to the EPA and to the California Department of Food and Agriculture for registration, over 90 percent of the data pertaining to human health effects and environmental impacts of the chemical and its formulated products were classified by the registrant as "trade secret" information. Id. at ix. Without full and open discussion by scientists in state regulatory agencies and universities, the public cannot be assured of a chemical's safety. Id.

The Massachusetts Generic DES also found that no data on glyphosate are publicly available. Mass. DES at 30.

The DES turns the absence of data on glyphosate into evidence that it is safe.[4] The text cites no authority for this claim; Appendix K cites a report prepared for BLM in 1983 and 1984 Forest Service pesticide background statements, both of which base their claims largely on classified Monsanto data. DES at 116-17. The DES text does not disclose the almost total absence of public

knowledge about glyphosate, and does nothing to dispel the inference that the absence of evidence of mutagenicity and carcinogenicity rests on a solid data base. Appendix K does acknowledge the scarcity of public information on glyphosate, but does not suggest that that scarcity impedes accurate risk assessment. The DES thus misrepresents the state of scientific knowledge about glyphosate and the degree of risk associated with its use. Until BLM discloses the uncertainty surrounding glyphosate, the public and the decision-maker cannot make an informed decision about the advisability of its use and the adequacy of proposed mitigation measures to protect public health. 44-35

c) 2,4-D

44-36 2,4-D has not been reregistered by the EPA. In 1980, in response to great public pressure, EPA reviewed much of the 2,4-D literature. It declared invalid the large body of adverse data on the grounds that the published papers did not include the detailed individual records for each animal which are now required with the manufacturers' test data. (No journal would publish such detailed data.) Nearly all negative tests of 2,4-D health effects were also invalid under modern testing criteria, leaving EPA with practically no valid data at all. EPA, Review & Conclusions Concerning Potential Health Effects of the Herbicide 2,4-D (Apr. 29, 1980) (cited in Prefiled Direct Testimony of Dr. Ruth W. Shearer [former program director for cancer research at Issaquah Health Research Center, Washington], in Petition of Vermont Public Interest Research Group for an Administrative Rule Suspending the

Use of 2,4-D and/or Picloram, before the Vermont Dept. of Agriculture 17-18 [Aug. 12, 1983] ["Shearer VPIRG Testimony"]). EPA consequently issued a notice in August, 1980 that registrants must begin to develop data on 2,4-D in the categories of oncogenicity, reproduction, teratogenicity, neurotoxicity, metabolism, acute oral toxicity, acute dermal toxicity, and dermal absorptions. EPA, Order & Notice to Registrants of 2,4-D (Aug. 29, 1980) (cited in Shearer VPIRG Testimony at 18).

Of the 25 required new tests, as of August 1983, 16 short-term tests had been completed and submitted to EPA but had not yet been released for public information and peer review. The results of the new chronic effects and cancer studies in animals were not scheduled for evaluation by EPA before at least 1985. Shearer VPIRG Testimony at 18. 44-37

The discussion in the BLM DES of 2,4-D toxicity is based on a February 4, 1983 BLM information memorandum. DES at 109. BLM therefore lacked valid data on which to base its conclusion that 2,4-D presents "no significant risk of toxicity." Id. at iii.

44-38 Dr. Ruth Shearer has testified on the effects on humans of 2,4-D exposure. Many of those injured were young forestry workers, but others were poisoned by the drifting of aerial spray, hand-spraying of weeds, drinking from a contaminated spring or inhaling powdered 2,4-D. Many remain incapacitated years after exposure.[5] Nearly all the human symptoms of 2,4-D poisoning are

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[4] "No treatment-related effects on reproductive performance have been observed. No evidence of birth defects has been observed. There is no evidence that glyphosate is a mutagen. No carcinogenic effects have been observed through animal feeding studies." DES at 50.

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[5] Acute symptoms include nausea, vomiting, diarrhea, headache, temporary loss of vision, weakness, burning eyes, and difficulty in thinking. Residual effects include chronic respiratory impairment, bleeding tendency, concentration and memory problems,

undetectable in laboratory rodents. Altered brain function and paralysis, however, have been reported in test animals. Shearer VPIRG Testimony at 7-9 (citing Elo et al., "Substantial Increase in the Levels of Chlorophenoxyacetic Acids in the CNS of Rats as a Result of Severe Intoxication," 41 Acta Pharmacol. & Toxicol. 280-84 [1977].)

44-39 According to Dr. Shearer, reports of cases of 2,4-D poisoning have been published. BLM should respond to these reports and explain why the data on human poisoning do not indicate that 2,4-D constitutes a significant risk to human health.

d) Picloram

Picloram has not been reregistered by the EPA. EPA's opinion that Tordon (the trade name for herbicides containing picloram) is safe for use was based on three studies. Two were done by IBT, and were subsequently invalidated. Dow is repeating those studies; the results will not be ready for review until mid-1985. Gulf South Research Institute conducted the other picloram research, under contract to the National Cancer Institute (NCI). An EPA audit of Gulf South in the year that the picloram tests were completed found "serious deficiencies" in the Institute's testing procedures. Schneider, "Defoliant probed for possible links to cancer," Boston Sunday Globe 17 (Apr. 25, 1982).

The Gulf South Research tests produced a statistically significant increase in liver neoplastic nodules in female rats. The authors considered these tumors "benign." In response to the NCI study, the Occupational Safety and Health Administration (OSHA) received testimony from a large number of pathologists who urged the agency not to differentiate between benign and malignant tumors when addressing carcinogenic potential. Each of these pathologists cited a number of carcinomas with benign (or apparently benign) precursors. Based on this testimony, OSHA decided not to draw a distinction between benign and malignant tumors in a carcinogenicity study, unless that study could demonstrate that the tumor does not progress to malignancy. Mass. DES at II-154 (referring to 45 Fed. Reg. 5002 [Jan. 22, 1980]).
44-40 BLM does not mention OSHA's response to the NCI study. NRDC recommends that BLM adopt OSHA's position and treat picloram as a suspect carcinogen until it is shown that the induced nodules do not progress to carcinomas. BLM's statement that "[r]esearch has not found picloram to be carcinogenic" (DES at 113) turns scientific uncertainty into certainty, and is therefore highly misleading.

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and hypersensitivity to non-physiologic chemicals, which prevents participation in many modern employment environments.

The data base for picloram is inadequate to assure its safety. Nearly all of the testing has been done by the manufacturer, and most of it has studied acute effects. These test conditions are not relevant to chronic low-dose environmental exposure. Dow has consistently refused to allow public examination of its health test data. The DES acknowledges that "data submitted for registration of the compound [is] still held
44-41 proprietary." DES at 113. NRDC disputes BLM's conclusion that irrespective of the above-mentioned data gaps, picloram's "hazard can be satisfactorily assessed." Id. NRDC recommends that BLM suspend the use of picloram until its safety has been established by comprehensive and public research.

e) Conclusion

The pervasive uncertainty about human health effects that characterizes herbicide toxicology and the negative experience already recorded of workers and members of the public who have been exposed to the herbicides in question discredit BLM's claim that herbicide use will result in "[n]o adverse impacts." Id. at 12. BLM misleads the public by suggesting that it can make assurances as to herbicide safety with certainty. At this point, no safe level of exposure has been established for the herbicides at issue here; accordingly, their use should, at a minimum, be deferred pending further study. NRDC recommends that BLM prepare an EIS that acknowledges both the current lack of knowledge in the field of herbicide toxicology and the existing indications of herbicide hazard, and that it develop and implement a non-chemical weed treatment program, should it establish that such a program is necessary.

B. The DES Fails to Prove or Fabricates the Likely Benefits from the Herbicide-Spraying Program.

The DES claims benefits for the herbicide-spraying program that are neither proven nor realistic.

44-42 The DES claims that "Alternative 1 would improve the ecological conditions of rangelands and stop the spread of noxious weeds to noninfested lands." Id. at 11. This claim ignores the adverse impacts of vegetation, soils, water and wildlife noted above, and assumes a success rate that is never proven in the DES.

The herbicide program is expected to "have beneficial social impacts on communities in the EIS area," to "provid[e] the best possible total cooperative weed control effort...with other landowners in the EIS area," and to "generate more constructive social responses and concerns." Id. at 46, 38 and 12. These
44-43 claims are wholly fanciful. Governmental herbicide and pesticide spraying has produced great social conflict, spawning litigation in communities across the country. See, e.g., Oregon Environmental Counsel v. Kunzman, 714 F. 2d 901 (9th Cir. 1983); SOCATS v. Clark, 720 F. 2d 1475 (9th Cir. 1983); SOS v. Clark, 747 F. 2d 1240 (9th Cir. 1984); controversy over picloram-spraying in North Carolina, documented in, inter alia, Schneider, "Agent White -- new menace for U.S.?" Chicago Tribune 1 (Apr. 25, 1982). Herbicide spraying has no potential for "generat[ing] more constructive social responses," since it relies solely on capital-intensive technology applied by government agents, rather than integrating local land-users in a creative response to noxious weeds. No cooperation of landowners is needed beyond their keeping their cattle and themselves out of the sprayed areas.

The DES asserts that "[r]ecreation areas infested with noxious weeds would benefit by decreased visitor exposure to adverse affects [sic] from weeds. Visitor use would increase."
44-44 DES at 12. The DES offers no evidence that visitor use of public lands is affected by the presence of noxious weeds, or that the public takes into account the presence of noxious weeds in its

decision to use public lands, both of which conditions are prerequisite to the claim that "[v]isitor use would increase" under the herbicide program.

V. The DES Takes a Worst Case Approach to the Analysis of Alternatives to the Herbicide Program that Assumes the Failure of Such Alternatives and Ignores their Benefits.

BLM reached the conclusion that non-herbicide weed treatments are ineffective prior to preparing the DES, rather than as a result of analysis in the DES. Such a priori decision-making violates NEPA's requirements that "[e]nvironmental impact statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made," (40 C.F.R. § 1502.2[g]) and that agencies shall "[r]igorously explore and objectively evaluate all reasonable alternatives." 40 C.F.R. § 1502.14(a). Throughout the
DES, BLM assumes, without evidence, that alternative methods of
44-45 weed control are ineffective. It equates the non-herbicide
alternative with the no-action alternative, although these two alternatives would obviously produce different results.[6] The

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[6] "Alternative 3 would affect livestock and wild horses much as would Alternative 4 because nonchemical control measures would not adequately control weeds;...Alternative 4 would cause a decline in recreation use by allowing noxious weeds to spread as would Alternative 3 where nonchemical treatment would fail to produce the desired results;...Alternatives 3 and 4 could potentially cause economic losses by allowing noxious weeds to spread on public and nearby nonpublic land;...Alternatives 3 and 4 could significantly increase the health hazard to humans because of the decreased control of weeds." Id. at iii. "Alternative 3 would most likely result in impacts [on vegetation] similar to those of Alternative 4 because (1) manual and mechanical methods are much less effective and efficient than herbicides in controlling noxious weeds and (2) most biological agents are still in experimental stages, and their ability to effectively control noxious weeds is in question." Id. at 40.

DES provides no data on the success rates of non-chemical
44-46 treatments nor estimates of the likelihood of future improvements
in physical and biological weed control techniques.

Not only does the DES not evaluate the effectiveness of alternative treatments, it exaggerates or fabricates negative consequences from their use and misrepresents their actual likely impacts.

The DES describes in great detail the "dangers" to workers from manual treatments. Id. at 48. It lists the ailments that can follow from contact with weeds (and the latin names for the weeds), and it evaluates the significance of those ailments and
their risk.[7] In contrast, the DES never details the ailments
44-47 that have followed exposure to toxic chemicals nor evaluates their
seriousness. The concern shown by BLM for hayfever (id. at 51) and snake-bite (id. at 48) is grossly misplaced, given its indifference to the cancer, fetal deformity, brain damage and terminal illness that can be produced by exposure to toxic chemicals. The DES lists a series of exotic ailments that can follow from consumption of contaminated goat milk, flower nectar, or herbal teas. Id. at 51. These incidents are much rarer and more fortuitous than the systematic exposure of workers and the public to toxic chemicals in their environment.

The DES claims that visitor use of public lands would decline under Alternatives 3 and 4 because of increasing exposure of

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[7] Individuals can "react severely...[experience] major discomfort or health risk...severe hazard of hand pulling...high potential for poisonous snake bite...[bites are a] serious health concern." Id. at 48.

visitors to noxious weeds. Id. at 45. As mentioned above, BLM produces no evidence that visitors are even aware of noxious weeds on public lands, much less that their recreational decisions are affected by that awareness.

The DES misrepresents the impacts that the non-herbicide treatments would have. It claims that "[u]nder...alternative [3], the local economy would either be unaffected or slightly changed," whereas Alternative 1 "would generate spending in the local
economy." Id. at 46. This statement is wrong, since it ignores
44-48 the fact that manual "methods are highly labor intensive." Id. at
10. Alternative 3 would generate much greater activity in local economies than Alternative 1, which is capital-intensive.

The DES makes the confused claim that "[s]ince nontarget plants would be trampled by workers applying herbicide, impacts of manual treatment would be greatest under Alternative 3, progressively less under Alternatives 2 and 1, and nonexistent under Alternative 4." Id. at 38. Presumably BLM meant to suggest that manual treatment would result in greater destruction of non-
target plants than would herbicide treatment. This suggestion is
44-49 absurd, given that herbicides are relatively non-selective and
cannot distinguish among target and non-target vegetation. The non-chemical adverse impact of Alternative 1 would also be greater than that of Alternative 3. Under Alternative 1, ground vehicles will apply herbicides on 13,665 acres of land, ground backpacks will be used on 1,678 acres. Alternative 3 will treat 4,800 acres manually. Ground vehicles destroy vegetation and good soil condition to a far greater extent than does a perambulating human

being, and under the proposed action, this mechanical destruction
44-50 will occur on over three times the acreage than would be affected
by manual workers under Alternative 3. The impacts from "trampl[ing]" on the 1,678 acres treated by ground backpack under Alternative 1 would be similar to those on the 4,800 acres treated manually under Alternative 3.

The DES claims that Alternative 3 is "[l]ikely to generate a
44-51 very strong polarized reaction" in the "[s]ocial [e]nvironment."
Id. at 13. This claim defies understanding and is contrary to all experience. Manual treatment is innocuous and inconspicuous, and thus, uncontroversial, whereas chemical treatment is highly visible and fraught with controversy.

The DES ignores the benefits from non-herbicide treatments. Innovative techniques such as land imprinting, developed for the U.S. Department of Agriculture's Southwest Rangeland Watershed Research Center, can improve the condition of the land on which they are used. See, e.g., "Land Imprinter Does Job of Restoring Rangelands," U. S. Dept. of Agriculture S & E Newsmakers (Sept. 1981). The U. S. General Accounting Office has recommended that the Forest Service and BLM increase their use of non-herbicide treatments in order to generate information on the costs and efficacy of the various methods and provide site-specific experience with alternatives, both of which results would enable the agencies to meet their management goals without their current reliance on herbicides. GAO, Better Data Needed. BLM use of non-chemical methods of weed control would encourage the research and development of more effective non-chemical management techniques.

The use of manual methods eliminates both the risk to human beings and to the environment of poisoning from toxic chemicals, and the economic loss from treating the victims of such poisoning and from irremediable destruction to the environment by chemical contamination.

VI. The DES Violates NEPA Requirements for the Evaluation Actions Proposed in the Context of Scientific Uncertainty.

The DES violates all of NEPA's requirements for the evaluation of the "significant adverse effects on the human environment" of actions proposed where "there are gaps in relevant information or scientific uncertainty." 40 C.F.R. § 1502.22.

44-52 The Council on Environmental Quality (CEQ) regulations require that "the agency shall always make clear that such information is lacking or that uncertainty exists." Id. The DES recurrently conceals the lack of information on the herbicides, especially in the Summary. It does not mention EPA's reregistration requirement nor the EPA's invalidation of the IBT testing, which left large and still unresolved data gaps.

44-53 The regulations require an agency to "weigh the need for the action against the risk and severity of possible adverse impacts were the action to proceed in the face of uncertainty." Id. at § 1502.22(b). The DES never undertakes this weighing process. Rather, it assumes without analysis that the action is necessary, and that it will be without adverse impacts.

The agency must "include a worst case analysis." Id. Both the CEQ and the courts have explicated this requirement. The CEQ explains that "[i]n addition to an analysis of a low

probability/catastrophic impact event, the worst case analysis should also include a spectrum of events of higher probability but less drastic impact." 46 Fed. Reg. 18032 (Mar. 3, 1981) (cited in SOS v. Clark, 747 F.2d 1240, 1245 [9th Cir. 1984]). The CEQ thus takes as its paradigm "worst case" the "low probability/catastrophic impact event." In Sierra Club v. Sigler, 695 F. 2d 957 (5th Cir. 1983) (cited in SOS v. Clark, supra), the Fifth Circuit reconfirmed the requirement of analyzing the catastrophic event in a worst case analysis. The Court required the Army Corps of Engineers to prepare a worst case analysis hypothesizing a massive oil spill in Galveston Bay.

44-54 BLM's worst case analysis of the herbicide-spraying program does not address the worst case of a major spill of herbicides during preparation or application. Instead, it analyzes only slight, systematic errors in the program. A major spill of herbicides during their preparation in the factory or the field, or during their application, could injure the human beings who come into contact with the herbicides and produce permanent environmental damage. Such a spill would be catastrophic, but it is not "low probability." The many stages of preparation and application of herbicides render an accident likely. Until BLM prepares an analysis of the consequences of a major spill of herbicides, the public and the decision-maker cannot "weigh the need for the action against the risk and severity of possible adverse impacts." 40 C.F.R. § 1502.22(b).

44-55 The Worst Case Analysis ignores synergism as an adverse impact of the herbicide spraying program. The chemicals applied

under the program may interact with each other, and/or with chemicals already present in, or subsequently applied to, the environment. Since, according to BLM's estimate, the program will "consist of...less than 1 percent...of the overall chemical use in the EIS area," (id. at 37) synergistic interaction between program chemicals and other chemicals is probable. Synergism is a dangerous and largely unstudied chemical process. Testing of chemicals proceeds on a chemical-by-chemical basis; few tests have been run on chemical combinations. Synergistic chemical compounds could have far more negative impacts than has been heretofore documented. The Worst Case Analysis should analyze the impacts of synergism on human health and the environment.

44-56 The Worst Case Analysis fails to follow standard regulatory practice by not adjusting the No Observed Effect Levels (NOELs) of animals exposed to herbicides in laboratory tests downwards before applying them to human beings. NOELs are usually decreased by a factor of 10 before applying them to the adult population, and by a factor of 1,000 before applying them to children and other sensitive groups.

VII. The DES Violates the Formal Requirements for Environmental Impact Statements.

44-57 The CEQ regulations provide that the EIS contain a summary that "adequately and accurately summarizes the statement. The summary shall stress...areas of controversy (including issues raised by...the public)." 40 C.F.R. § 1502.12. The DES Summary does not satisfy this requirement. It omits mention of the controversy about the safety of herbicides. It ignores many of

the negative consequences mentioned in the main body of the DES. It is silent about data gaps, and about the need for a worst case analysis.

An EIS appendix "[n]ormally consist[s] of material which substantiates any analysis fundamental to the impact statement." 40 C.F.R. § 1502.18. The DES appendices do not substantiate analysis; rather, they present important information for the first time which should be part of agency analysis.[8]

VIII. The Deficiencies in the DES Deny the Public Its Participation Rights Under NEPA.

NEPA guarantees the public the right to participate in environmental review through the scoping and the commenting processes. 42 U.S.C. § 4332(2); 40 C.F.R. §§ 1501.7(a)(1), 1502.1, 1502.14, Part 1503. Because the herbicide-spraying program is so poorly specified in the DES, however, the public is unable to exercise its right to comment on the proposed action to the fullest extent, since its exact features remain unknown. The DES's failure to analyze alternatives to the herbicide program impedes the public's ability to assess the viability of the alternatives and the relative merits of the agency's preferred alternative.

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[8] In the appendices, we learn for the first time that "[f]ew studies...have been conducted on the fate and persistence of dicamba in water," that "[d]icamba is phytotoxic to a variety of plants, including conifers," that a "somewhat higher probability may exist of environmental contact with dicamba than with some other herbicides because dicamba does not bind as tenaciously to organic and inorganic matter as do most other agents, [and that] dicamba applied next to a stream has a somewhat greater tendency than other herbicides to wash in with the first rain after application because of the limited binding." Id. at 108. We learn of 2,4-D that it "can persist for many months in the absence of favorable soil conditions,...[i]n cool, nutrient-poor, natural surface waters, [it] may remain stable for many months.... 2,4-D is phytotoxic to many nontarget plants, including some crops and ornamentals.... [I]t is known to cause musculoneural injury in humans and in experimental animals at high doses." Id. at 109. "In humans, myotonia has apparently occurred only after heavy exposure to [2,4-D], although in two or three cases sustained heavy exposure to diluted material may have occurred and some neurological effect was seen." Id. at 110. A controversy exists over 2,4-D contaminants (id. at 111-12). "Picloram is phytotoxic to many nontarget plants and is highly toxic to young pine seedlings. Several incidents of damage to nontarget plants from picloram spray drift have been reported. Certain plant species have been injured as long as 5 years after application because of picloram's persistence.... Traces of picloram of unknown origin have been found in water supplies over an extended period." Id. at 113-14.

IX. Recommendations.

NRDC recommends that BLM prepare an EIS that fulfills the requirements of NEPA, in accordance with the suggestions made above. It should establish through documentation the need for the proposed action, describe the action in detail sufficient to a determination of its likely impacts, analyze in detail its adverse environmental impacts, weigh the need for the action against the risk and severity of adverse impacts, "rigorously explore...all reasonable alternatives" to the herbicide spraying, (40 C.F.R. § 1502.14[a]) perform a worst case analysis on a catastrophic spill, and correct the methodological and formal flaws of the DES. Unless the DES is thoroughly revised and a new proposed action developed, it will undoubtedly be ruled inadequate in court.

NRDC believes that a comprehensive analysis of the herbicide program and of alternatives to it that satisfies the requirements of NEPA will demonstrate that herbicide spraying is neither economically justified nor environmentally sound. The BLM should attack the source of the problem -- improper and excessive

livestock grazing -- rather than throw money at a futile remedy. To the extent that weed control is deemed necessary, the Bureau should utilize alternatives to herbicides. Given the significant environmental and human health risks posed by herbicides, the major spraying program proposed by the Bureau is wholly unjustified and should be abandoned.

RESPONSE TO COMMENT LETTER 44

44-1 The presence of one weed means others will probably occupy the site in the future if control measures are not taken. Logically, the greater the ratio (number of noxious weeds present) the more likelihood of spread.

44-2 Appendix D is intended to show the distribution and spread of noxious weeds by county in the EIS area. Therefore, if a county is "shaded in" on the map for a particular weed, it exists somewhere in that county. The maps do not differentiate between private and public land.

44-3 The 13 percent rate of spread is the mean of the noxious weed target species' rates of spread. The average annual rate of spread ranges from 8 to 24 percent. See Appendix C-1.

44-4 See response to comments 43-47 and 43-48.

44-5 See the following references: Bucher 1984 and Penhallegon 1983. Information on economic loss from noxious weeds on lands administered by BLM was not available. As explained in the narrative of the DEIS, the Washington study was used as an illustration. The "undisclosed amount" appears in Table 3-3 under acres of noxious weeds in 10 years (13 percent rate of spread), Alternative 4: 83,354, or it could be calculated given the assumptions presented in the text and table (PV = 24,555, i = 13, n = 10, FV = 83,354).

Dr. Gary Lee of the University of Idaho, Dept of Agriculture estimates the economic loss due to noxious weeds in Idaho alone to be more than $500 million per year. It is important for BLM to institute long-term weed management programs on all lands under its jurisdiction. If weeds are not controlled or contained, they provide a constant source of infestation and economic impact to all adjacent lands as well as to lands downstream. BLM involvement in statewide or countywide coordinated management projects is the most practical solution to controlling noxious weeds in the EIS area. Estimates of economic losses from noxious weeds are discussed in comment letters 12, 13, 14, and 32.

44-6 See response to comment 44-5.

44-7 See response to comment 18-1.

44-8 Table 3-3 compares alternatives and makes no attempt to show that the noxious weeds will be eradicated.

44-9 The $361,000 is related to the losses measured in the Washington study (Penhallegon 1983) and was used as an illustration. This figure was not related to losses or gains from animal unit months (AUMs) of forage lost or reclaimed or changes to local personal income and employment as presented in the EIS analysis.

44-10 The table on Individual Treatment Costs per acre in Appendix J is based on annual treatment. The costs are based on previous years' records from BLM county weed control charges and contract charges.

44-11 The costs of EIS preparation, litigation, accidents, and training were excluded from the display of costs because selective assignment to individual alternatives would have been arbitrary. Conversely, equal assignment to all alternatives would have increased the accounting detail without highlighting the differences among alternatives. The total cost of preparing the EIS is about $70,000.

44-12 Helicopter costs are part of contract charges. These charges are based on either cost of application per acre or cost per flight hour of application. There are no stand-by or downtime charges. In some instances there are ferry charges when a helicopter flies from one location to the next.

44-13 BLM may flag buffer zones, but it does not fence them.

44-14 See responses to comments 21-3, 29-2, and 31-13.

44-15 Under the Council on Environmental Quality (CEQ) regulations, public involvement can vary according to the type of document to be prepared (EIS, EIS supplement, environmental assessment). The public is and will continue to be involved as appropriate in BLM's environmental analysis and appropriate documentation processes.

44-16 Effective alternatives would include any nonchemical method of weed control.

BLM will evaluate the area to be approved for spraying on a case-by-case basis, considering the topography, other vegetation in the area, and the potential for spread of infestation. Once all these variables have been evaluated, the appropriate land treatment method and area size will be determined.

44-17 See common issue 6.

44-18 BLM's public involvement process (see response to comment 44-15) does provide the opportunity for the public to comment on the exact features of a program. The findings of the site-specific environmental analysis will determine what document will be prepared.

44-19 The EIS does not rely solely on state standards for establishing buffer strips. As stated in Appendix I, "Minimum buffer strips will meet or exceed state mandated protected buffer strips." At the least, BLM will meet those restrictions. But if conditions warrant, more stringent standards will be applied, or no chemicals will be applied. Also see common issue 3. You refer to page 102 of the DEIS for your comment, and perhaps the statement--"will be determined by individual states" is misleading. This statement has been changed to read "will be determined by local BLM offices in the individual states."

Some ground water recharge areas are sensitive and require extreme care. These areas will be analyzed on a site-by-site basis when herbicide application is being considered. Determining the cone of depression for all well system aquifers is beyond this EIS's scope.

44-20 The basin and range soils of southern Idaho, eastern Oregon, and portions of central and eastern Washington are predominantly arid. The Impacts to Ground Water section of Chapter 3 (page 37 of the DEIS) addresses the potential for percolation to ground water. Also see responses to comments 31-10, 43-46, and 44-24.

Appendix M addresses scientific uncertainty.

44-21 The text cited studies of herbicide applications where levels were both detected and undetected in the water These studies are relevant to the Proposed Action because the chemicals studied are the same as those proposed for use under the Proposed Action. Since the restrictions that were in effect on these applications are not known, these studies cannot directly be correlated to BLM's proposed treatments where stringent guidelines are incorporated. For example, the study conducted by Norris and Montgomery (1975) on dicamba "attributed these residues to drift and to direct application of dicamba to water surfaces." Because BLM's guidelines do not allow direct application to water surfaces, those results are not expected. In the cited studies, the concentrations did not exceed human health levels; lower concentrations would be expected from BLM treatments.

44-22 The term ephemeral streams was used to refer to the small ephemeral channels at the upper reaches of a drainage system. These channels usually range from a couple of feet to several yards in width and depth. The normal helicopter treatment unit is less than 100 acres. Significant amounts of herbicides would not be flushed downstream because one of two situations normally apply: (1) enough rain falls to induce runoff but not enough for the streamflow to reach the next order stream or (2) if the streamflow is great enough to reach the next order stream, the next order stream would have enough water to dilute the herbicide. Moreover, BLM's weed control program would protect larger ephemeral channels typically found near or in valley bottoms. For example, areas of riparian habitat or standing water would be subject to treatment restrictions. Also see common issue 6, dealing with the size of operations.

44-23 The "less than 1 percent" statement you question was meant to convey that the BLM program is small in comparison to the total national herbicide use. For instance, the U.S. Forest Service newsletter, "Fact Sheet", of 2 March, 1984, noted that 50 million pounds of 2,4-D were sold within the United States during 1982. (See Table 1-3 of this FEIS showing acres of treatment and maximum amounts per acre of herbicide to be applied.) On the basis of Table 1-3, BLM would annually use 26,256 pounds of 2,4-D for this program or only 0.0005 percent of the national 2,4-D total in 1982. The same type of comparison is expected with the other herbicides included in this analysis.

44-24 The need to address specific areas with a more detailed analysis is a function of our site-specific environmental analysis and appropriate documentation process required before individual treatments. BLM did not mean to contend that ground water would or could not be contaminated, but there are no data revealing that BLM-applied herbicides have been detected in ground water. There are cases of nonfederal land treated with herbicides where herbicide levels have been detected in ground water and cases where herbicide levels have not been detected. In any case, with BLM procedures for conducting environmental analysis to determine sensitive areas and with the guidelines for applications, the potential for influencing ground water quality is slight.

44-25 See responses to comments 20-2 and 29-2.

44-26 BLM's policy is to protect threatened, endangered, and BLM sensitive species. BLM will adhere to Section 7 of Public Law 97-304.

44-27 Feeding studies on laboratory animals have shown some chronic and acute toxic effects. However, these resulted from extremely high dosage rates when compared to what could be consumed by any animal in the field, especially given BLM's low application rates, which are far below the label maximums. BLM's design features will also protect wildlife as a whole. Also see response to comment 33-1.

44-28 See common issue 3 on buffer strips and response to comment 31-13. The Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates (Johnson and Finley 1980) gives us acute toxicity to several fish of by the herbicides proposed in the EIS.

44-29 An assumption that the program will be implemented without a single error was not made. In fact, the WCA allows for minor and major mixing errors, swath overlap and accidental spills.

Any chemical registered for use to control noxious weeds has been determined by EPA to present no significant toxic effects, as required by Section 3C-5 of FIFRA. It should also be noted that the chemical would not be applied at full strength as permitted by the label.

44-30 There have been a few cases where weeds have developed a resistance to a specific herbicide. This is more likely to occur with annuals rather than with creeping perennials. Common practice is to switch herbicides when this occurs, rather than applying greater doses at more frequent intervals.

44-31 Appendix M was written because of data gaps pertaining to carcinogenicity. The registration process is not within the scope of this DEIS. All the chemicals proposed for use are currently registered.

44-32 IBT did in fact do many test supporting registrations of the four discussed herbicides. Since the tests have been invalidated, most of the studies have been replaced with newer validated research. Because of the validation problems with IBT studies, BLM has avoided referencing any of these studies.

44-33 No epidemiologic studies associate any of the herbicides with heritable mutations. Furthermore, no risk assessments that demonstrate the probability of mutations are found in the literature or from EPA. Laboratory studies present the best available information on mutagenic potential.

For some of the herbicides, the results of the mutagenicity tests conducted are insufficient to adequately assess the risk of mutagenic effects; in these cases, the result of carcinogenicity tests of cancer risk assessments can be used to estimate the risk of heritable mutations. The rationale for this assumption is summarized by the U.S. Forest Service (1984) as follows: "Since mutagenicity and carcinogenicity both follow similar mechanistic steps (at least those that involve genetic toxicity), the increased risk of cancer can be used to approximate the quantitative risk of heritable mutations". The basis for this assumption is that both mutagenicity and at least primary carcinogens react with DNA to form a mutation or DNA lesion affecting a particular gene or set of genes. The genetic lesions then require specific metabolic processes to occur. It is believed the cancer risk provides a worst case approximation to heritable mutations because cancer involves many types of cells where as heritable mutations involve only germinal (reproductive) cells.

Dicamba was non-mutagenic when exposed to various microbial assay systems, and in vitro human cell assays (USDA, 1984). Positive mutagenic responses were observed after exposure of dicamba to the B. subtilus and E. coli toxicity assays indicating that microbial DNA had been damaged. Considering that dicamba was nonmutagenic in the great majority of assays conducted, it was determined that dicamba presents no potential for mutagenic effects. Available evidence does not indicate that dicamba is carcinogenic. A 2-year rat feeding study resulted in the absence of any toxic or oncogenic effects of dicamba at 500 ppm. EPA has requested additional cancer studies for dicamba (EPA, 1984).

44-34 Dicamba use will conform to current label directions (EPA Reg. No. 876-25AA) concerning contamination of irrigation ditches and water for domestic use.

44-35 After the DEIS was published, BLM learned that EPA would soon release data implicating glyphosate as a weak carcinogen. In response to the data released, glyphosate has been included in the worst-case analysis in Appendix M of the FEIS.

44-36 2,4-D is currently registered by EPA (EPA Reg. No. 464-1-AC, EPA Reg. No. 264-261-AA, etc.). When results of ongoing tests of oncogenicity, reproduction, teratogenicity, neurotogenicity, effects on metabolism, and acute oral toxicity are completed, EPA is charged with reevaluating and judging the human health effects of 2,4-D.

44-37 See response to comment 44-36 concerning new toxicity studies.

44-38 BLM is aware of all scientific research data cited in Dr. Shearer's testimony as well as her interpretations of that data. The original sources have been reviewed, used and cited in Appendix K (Hazard Assessment) and Appendix M (The worst-case analysis).

44-39 The herbicide 2,4-D is the most widely studied of the chemicals proposed for use. BLM assumes that 2,4-D is toxic to humans and presents the potential risks to human health in the worst case analysis (see Appendix M).

44-40 Picloram is treated as a carcinogen in the worst-case analysis in Appendix M.

44-41 In Appendix K, Chemical Hazard Assessment, there are four sources of information for toxicity evaluation cited that are independent of proprietary data.

44-42 See responses to comments 20-2, 29-2, 31-10, and common issue 6.

44-43 BLM recognizes that government pesticide spraying has created controversy. That is why this document addresses concerns and issues raised in the briefs presented to the Ninth Circuit Court and in the District Courts of Oregon and California in regard to applying herbicides and their potential harm to human health. BLM also recognizes that another pesticide controversy has been raised by people across the EIS area. This controversy concerns the lack of the use of pesticides for controlling noxious weeds, which are increasing the economic burden on private landowners and state and federal taxpayers. County and state governments expressed strong concerns when the BLM spray program was shut down by judicial actions.

44-44 Visitor use can be affected by the presence of noxious weeds, particularly in developed recreational sites. For example, the presence of thistles in BLM camping areas along rivers used by boaters can discourage camping. Visitor use would increase in these areas if the weeds were controlled.

44-45 Herbicides are still the most efficient means of controlling most noxious weeds. Insects have been successful in treating some weeds, such as tansy ragwort in Oregon, and they have been extensively used. But for most noxious weeds, effective nonchemical control measures have not yet been developed.

44-46 See responses to common issue 8 and comment 44-16.

44-47 BLM is not indifferent to the effects of herbicides on the environment or on human health. Credible research data have not shown a plausible contribution by the Proposed Action to the diseases or ailments alluded to. The health effects that can be caused by noxious or poisonous weeds are described to illustrate potential hazards resulting from noncontrol or the use of alternatives other than the Proposed Action.

44-48 The local economy would either be unaffected or slightly changed because of both beneficial and adverse changes that would occur under Alternative 3. Beneficial changes would involve increased employment and personal income related to weed control activities and expenditures for weed control. Adverse changes would involve the loss of livestock forage on both public and nonpublic lands because of the continued spread of weeds. Loss of livestock could occur from ingestion of spreading poisonous weeds.

44-49 Alternative 3 (No Herbicide Use) would have the greatest impact on non-target vegetation from the manual treatment component of the program because the acreage treated manually would be over 17 times greater than that under Alternatives 1 and 2. The discussion cited in your comment was not intended to compare the impacts of all treatments, only those of manual treatments in each alternative.

44-50 Manual treatment impacts under Alternative 3 would be at least three times greater than manual treatment impacts under Alternative 1 because of trampling.

44-51 BLM believes that the comment letters on the DEIS further support the statement that you are questioning. The letters reveal that, in contrast to those who don't want herbicides used in controlling noxious weeds, many do want herbicides used because they recognize the serious consequences of not adequately controlling these weeds using the most efficient and effective means available.

44-52 Registrants are conducting research to comply with EPA's reregistration requirements. These studies are discussed in Appendix K, Chemical Hazard Assessment. For a discussion of IBT tests, see response to comment 44-32.

44-53 Federal law requires BLM to control noxious weeds on the land it administers. The need for the action is specifically stated in the Purpose and Need section of Chapter 1 in the EIS. The worst-case analysis is one component of the weighing process that will be completed when a decision is made.

44-54 Accidental spills have been added to the worst-case analysis, see Appendix H.

44-55 A discussion of synergism has been added to Appendix K, Chemical Hazard Assessment.

44-56 The standard practice of adjusting NOELs by a factor of 10 to account for animal test data and sensitive populations is more than accounted for by the large MOS values determined for public exposures. In addition, the high degree of conservatism included in most assumptions adds further safety emphasis.

44-57 Revisions have been made in the Summary.

45

Earth First!

TO: William Leavell
Oregon State Director, BLM
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Sir:

Thank you for the opportunity to comment on your Northwest Area Weed Control Program. I make these comments on behalf of Earth First! as well as myself.

45-1 I believe this program contains some major shortcomings, that public input was not adequately sought and a new draft EIS should be written.

45-2 The question is never answered, why a program of this scale is being undertaken. There is no data on the success of past programs, no data on cost/benefit ratios of past efforts. What is the predicted efficacy of this much expanded program? Range maps for different species of plants have no relevance if there is no way to know what effects a control program will have.

Further, the Secretary is authorized to cooperate in state eradication programs, participation is not mandated. The plants to be sprayed do

45-3 not fit the legal definition authorizing cooperation. Most of the plants that are to be controlled are native and not introduced "Foreign and injurious".

45-4 The preferred alternative is economically unjustified. Predicted gains of 3,000 AUM would have a current fee value of $4,000. A return of less than 1¢ on the $1.00. Even if "no action" alternative 4 was taken the loss in AUM's amounts to less than $8,000., hardly reason to spend $1,400,000. The argument that weed control creates local jobs sounds rather hollow when the draft also states that "One spray crew could do the whole job". If this is a rational for this program why is there no economic analysis of the number of the local jobs created, including the number of jobs that would be created by manual control as proposed in alternative #3.

The draft fails to include a full range of alternatives or to consider what alternatives that are offered objectively. Alternative

45-5 #3 which would use manual and mechanical treatments is dismissed as ineffective purely due to agency bias, there is no substantive data to support the position. The lack of a I.P.M. alternative is a

45-6 major oversight considering the public concern in this area as exemplified by the Agent Orange controversy and the herbicide spray ban on public forest lands.

The draft EIS attempts to treat a symptom not the disease, the disease of overgrazing. According to BLM only 17% of all BLM land is in good to excellent condition. A BLM analysis of the first 22 grazing environmental impact studies found that 69% of those public lands were producing less than half their potential. Plant communities do not occur in a vacuum. They are ecological indicators of overgrazing and related management problems. In 1981 the Council on Environmental Quality's Desertification of the United States stated "Overgrazing has been the most potent desertification force, in terms of total acreage affected, within the United States."

Sincerely,

Steve Marsden
6166 Monument Dr.
Grants Pass, OR 97526

cc: Marie Reeder
Dave Foreman
Rick Bailey

RESPONSE TO COMMENT LETTER 45

45-1 BLM made an extensive effort to invite the public to participate in scoping for this EIS. See response to comment 45-5. In addition, a 60-day public review and comment period was established for the DEIS.

45-2 The discussion of the purpose and need to which BLM is responding in proposing this action has been revised for clarity. Also see response to common issue 2.

45-3 Public Law 90-583 (Appendix A) authorizes and directs the heads of federal departments to permit the commissioner of agriculture or other proper agency head of any state in which there is in effect a program for the control of noxious plants to enter upon any lands under their control or jurisdiction and destroy noxious plants growing on such land.

Of all the noxious weeds listed in Appendixes C-1 and C-2 as targeted or to be considered for treatment, only three are native. The Carlson-Foley Act (PL 90-583) does not require that noxious weeds be of foreign origin to be treated. Also see the definition of a noxious weed in the Glossary.

45-4 Benefits to the local economy from all sources were considered in the EIS. However, the quantified economic analysis focused on impacts on BLM-administered lands only. Economic impacts to adjacent landowners from controlling or not controlling noxious weeds were not quantified due to the difficulty in compiling available data such as are referenced in several of the comment letters.

45-5 See Table 3-3 on cost comparisons and acres treated. It would cost approximately the same to implement alternatives 1, 2 or 3, which provides a basis for comparison of effectiveness.

45-6 The Proposed Action (Alternative 1) is an integrated pest management alternative. See response to common issue 1.

46

[illegible], Chairman • [illegible] • [illegible] • Robert Roukouf • Joe Roos
RUTH V. ROOS, Secretary-Treasurer
PRAIRIE COUNTY *Co-operative State Grazing District*
TERRY, MONTANA 59349

July 29, 1985

Oregon State Director
R. Gregg Simmons
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

The Prairie County Cooperative State Grazing District, with a membership of 165 permittees,support Alternative I in the Northwest Area Noxious Weed Control Program.

It is imperative that all landowners, including Federal Government, take an active role in controlling noxious weeds in Southeastern Montana and the Northwest area.

Sincerely,

Ruth V. Roos, Sec;
Prairie County Cooperative State Grazing District.

47

Richland County Weed Board
Con Donvan, Weed Supervisor
County Extension Office
P.O. Box 1028
Sidney, Montana 59270

July 30, 1985

Oregon State Director
Bureau of Land Management
C/O R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Sir,

Alternative 1 is really the only one to consider if you are going to implement a weed control program for Bureau of Land Management lands in our area.

Why? We feel that access is severely limited in many locations. Also, timeliness is quite essential in any program. Aerial application is quite timely, accurate and judging from the 1984 application, extremely effective in controlling leafy spurge with very slight impact on wooded species.

Your Environmental Impact Study is thorough and shows a concern and understanding for all parties involved. Your team should be commended, regardless of the outcome.

The appendix section on noxious weeds and the manner of spacing is very useful information for us at the county level. This explains the weed situation and brings to the eye the emergency situation that we are now facing.

Sincerely,

Cornelius T. Donvan
Cornelius T. Donvan
Richland County Weed Supervisor

CTD/cc

Johnnie Johnston Chairman-Poplar
Red Lowe Secretary-Sidney
Gene Foss Culbertson
Klaus Jensen Savage
Lyle Larson Savage
Dan Watts Fairview

48

Cooperative Extension Service
MONTANA STATE UNIVERSITY, BOZEMAN, U. S. DEPARTMENT OF AGRICULTURE, AND MONTANA COUNTIES COOPERATING
REPLY TO:
P. O. BOX 1028
RICHLAND COUNTY
SIDNEY, MONTANA 59270
TEL. 482-1206

July 30, 1985

Oregon State Director
Bureau of Land Management
C/O R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Sir,

Saving our land resources for future use is very important and a worthwhile project. To save our resources, we, as managers of the land, must keep our options open. We must not discard any of our tools, but we need to use our tools diligently and wisely for the benefit of all the people.

Alternative 1 of the proposed action as outlined in the Northwest Area Noxious Weed Control Program, Environmental Impact Statement, gives the most options and will allow the most opportunity for land managers to control noxious plants for the benefit of American citizens.

Sincerely,

Red Lovec
Richard Lovec
Richland County Agent

RFL/cc

"The Programs of the Montana Cooperative Extension Service are available to all people regardless of race, creed, color, sex or national origin."

MONTANA STATE COLLEGE BECAME MONTANA STATE UNIVERSITY JULY 1, 1965

49

PRAIRIE COUNTY CONSERVATION DISTRICT
TERRY, MONTANA 59349

Telephone
(406) 637 5[illegible]

RUTH V. ROOS
Secretary-Treasurer

July 29, 1985

Oregon State Director
Bureau of Land Management
R. Gregg Simmons
PO Box 2965
Portland, Oregon

Dear Sir:

The Prairie County Conservation District endorses and supports Alternative I in the Northwest Area Noxious Weed Control program.

It is imperative that all land owners, including Federal Government, take an active role in controlling noxious weeds in Southeastern Montana and the Northwest area.

Sincerely,

Ruth V. Roos, Adm. Sec.
Prairie County Conservation District

50

Washington Native Plant Society
"Preserve and Enjoy Washington's Flora!"

4611-2ND. AVE. N.E.
Seattle, WA 98105

25 July 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Greetings,

This letter is the comment of the Washington Native Plant Society (W.N.P.S.) on the Northwest area Noxious Weed Control Program Draft E.I.S. published May 1985. It is prepared by Mark Egger, Conservation Chairman. The W.N.P.S. is an organization of over 600 professional and amateur botanists from all corners of our state who share an active interest in the preservation of our native flora.

We have identified a number of major defects in the E.I.S., and we must ask that you either prepare a new E.I.S. or substantially revise your preferred alternative in order to remedy these defects. Our objections to the E.I.S./P.A. are listed below.

1. While we do favor programs to control noxious weeds, we strongly object to your definitions of which species are noxious. We are *particularly* concerned about the inclusion of a large number of native American plants on two of your lists (appendix C-2 and C-3). We urge you to *delete* *all* *native* *species* from both lists, as native plants do not fall under the definitions of the enabling legislation, P.L. 93-629. The law defines noxious weeds as those which are "*foreign* and *injurious*" (emphasis added). 50-1

The listing of entire genera, e.g. *Delphinium* spp., *Lupinus* spp., and *Oxytropis* spp. is especially disturbing. Have you determined that all species in these genera are poisonous? How will you decide which species to treat? How will your workers identify and distinguish "troublesome" species from "innocent" ones, especially considering the extreme difficulty in the field identification of such groups as *Lupinus*? 50-2 Why should any *native* plants be eliminated from *public* lands to increase profits for *private* ranchers, especially considering the absurdly low price such ranchers pay to graze their animals on public lands? These are important questions which need to be addressed in evaluating the impact of your

proposed actions.

2. We strongly object to *any* program which utilizes broadcast spraying of herbicides, either by air or by land vehicle. We believe that the harm to hundreds of non-target native plant species, some of which are rare and declining, far outweighs any marginal benefits of such spraying. You claim, on P. 40, that environmental analysis of spray sites will prevent elimination of threatened, endangered and sensitive species, but how will you pay for botanists to adequately census 24,000 acres? How can you *guarantee* that such species are not present and will not be eliminated? 50-3 Broadcast application of herbicides is inappropriate on public lands, because of the inability to quantify or control the potential injury to native plants and their habitats, as well as to human health (see below).

3. We believe that it is absurd to ask the public to pay large sums of money ($1.4 million) to improve rangelands to benefit private sector ranchers, especially when these same ranchers are largely to blame for the poor

range conditions, which contribute substantially
to the spread of noxious weeds in the first
place. We suggest that you should have
included restrictions on grazing of infested
50-4 lands as a management technique in your
document.

4. We believe that you have not considered
a wide range of alternatives in the E.I.S.
50-5 While you claim that Alt. 1 (the P.A.) is an
"integrated" approach, it clearly is not. 86.4%
of the acres to be treated are scheduled for
chemical applications, hardly a balanced
approach. The P.A. is a radical proposal
which is favorable only to ranchers and
herbicide companies. We urge you to
develop and adopt a true Integrated Pest
Management alternative, combining a much
greater emphasis on manual and biological
controls with limited use of spot-applied
herbicides to the most difficult of the
perennials. Your scoping process was clearly
inadequate in its failure to include input
from proponents of true I.P.M. practices.

5. Your analysis of the effects of the various
proposed herbicides on human health and on the
human environment is inadequate. It is clearly
biased towards finding these chemicals safe!
Very little independent verification is done, and
50-6 you have relied far too heavily on the chemical
industry for your data and even for your
conclusions. Instead of proving that the
chemicals are safe, you assume that they are
safe and claim that no information exists
to demonstrate otherwise. Your "probability
of harm" statistics are biased, misleading, and,
as on P. 136, incorrect.

6. The economics of your program lead to
the conclusion that the P.A. is a boondoggle. You
claim on P. 46 that the P.A. will show a gain of
3000 AUM's at a cost of $1.4 million. At present
$1.35/AUM prices, about $4,000 is gained, giving a
net loss of $1,396,000 to the U.S. Treasury. Again,
you have not provided justification as to why
50-7 the public should pay for a program that will
benefit a handful of private ranchers, while
harming native vegetation and animals and causing
still undetermined health risks to the general
public.

In conclusion, we ask that you completely
revise both the E.I.S. and the P.A. to bring
about a program proposal that will control
noxious exotic plant species without harming
our native biota. We ask that the program
show a benefit to the health, well-being,
and pocketbook of the public in general, not
just to a few ranchers and chemical company
executives.

Sincerely,

Mark Egger, for the W.N.P.S.

RESPONSE TO COMMENT LETTER 50

50-1	See response to comments 7-1 and 45-3.
50-2	Before initial weed control projects, plant species present are field surveyed by field personnel with training in plant identification.
50-3	See response to comment 44-26.
50-4	See response to comments 6-2, and 43-47 paragraph 2.
50-5	See response to common issue 1.
50-6	See response to comment 44-41.
50-7	See response to comment 44-53.

51

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific Northwest Region
Westin Building, Room 1920
2001 Sixth Avenue
Seattle, Washington 98121

IN REPLY REFER TO:

L7619(PNR-RE)
DES 85/30

JUL 2 9 1985

Memorandum

To: State Director, Bureau of Land Management, Portland, Oregon

From: Regional Director, Pacific Northwest Region

Subject: Review of Environmental Impact Statement: Northwest Area Noxious Weed Control Program

Thank you for the opportunity to review the subject document.

51-1 We have some reservations about supporting Alternative 1, the proposed action, because almost all types of broad leaf plants would be eliminated by the aerial application of herbicides. The methods outlined in Alternative 2 would be more plant specific.

It is clear that neither Alternative 3 nor Alternative 4 would accomplish the purpose of the proposed program.

The Bureau is to be complimented for its stated commitment to utilizing an Integrated Pest Management approach to its vegetation management program.

Daniel J. Tobin, Jr.

cc:
WASO-762

RESPONSE TO COMMENT LETTER 51

51-1 BLM recognizes that helicopter application of herbicides would destroy more nontarget broadleafs than ground spraying (Chapter 3, Impacts on Vegetation). Reduced application rates and proper timing of application would reduce adverse impacts to nontarget vegetation. Also see common issue 6.

52

AUDUBON SOCIETY OF PORTLAND

A Branch of National Audubon Society

PHONE 292-6855 • 5151 NORTHWEST CORNELL ROAD • PORTLAND, OREGON 97210

TO: R. Gregg Simmons, EIS Team Leader, BLM Oregon State Office
Box 2965, Portland, Oregon 97208

FROM: Portland Audubon Society Conservation Committee
Contact: Lynn Herring

SUBJECT: Northwest Area Noxious Weed Control Program, DEIS

DATE: July 31, 1985

The following comments constitute a response from the Conservation Committee of the Portland Audubon Society to the Northwest Area Noxious Weed Control Program, Draft Environmental Impact Statement. The Portland Audubon Society, a 5000 member chapter of the National Audubon Society, shares its parent organization's long-standing concern about the threat of pesticides to our wildlife and habitat base. Accordingly, we have several concerns about the DEIS.

Alternatives

52-1 A glaring omission in the document is an Integrated Pest Management alternative (IPM) to provide a true range of alternatives. In Table 1-2, p.6, it is apparent that the alternatives are heavily biased toward chemical treatment. If Alternative 1, the Proposed Alternative for 24,564 acres which includes 5,900 acres of aerial application and Alternative 2, with no aerial application on its 20,629 acres, are not selected then not as much acreage is treated. "The objectives of the Proposed Action and federal and state laws would not be met," p.7. The likelihood of choosing Alternative 3, no herbicides on the 9,510 acres, is doomed from the beginning. Similarly, Alternative 4, no action, is unlikely to be selected.

52-2 An IPM alternative could appropriately emphasize the need for preventive management, p.8. No methodology is apparent to deal with why the so-called noxious weeds are present. In citing the Public Rangelands Improvement Act (PRIA) of 1978 regarding the BLM's mandate to "manage, maintain and improve (public lands suitable for livestock grazing)", it is well to consider that the best preventive management is good range management. Native range in good or excellent condition is not susceptible to invasion by most weeds. It may be more cost effective to correct the weed producing situation.

Alternatives and Economics

Alternative 3, no herbicides, states on p.6 that "(2) The dollar level of investment to implement this alternative would be the same as under the Proposed Alternative." This claim is supported in Table 3-3, p.45 as follows: Alternative 1, cost $1,398,000; Alternative 2, cost $1,423,000; Alternative 3, cost $1,396,000.

2

BLM NOXIOUS WEED DEIS --- Comments from Portland Audubon Society Conservation Committee

52-3 Does Alternative 3 really total the same as Alternatives 1 and 2? What are the supporting figures for the treatments? Why can't the acreage for the proposed manual, mechanical, and biological treatments be increased and remain within the budget if $1.4 million is the cap? Benefits should be quantified. How many local jobs would be generated with this alternative? On p.30 is this statement, "Weed control activities generate employment and personal earnings in the local economy." An economic analysis that carefully examines this chemically biased program is needed, especially those elements of Table 3-3, p.46, Table 1-2, p.6, and Appendix J., p.105.

52-4 To continue with Table 3-3, p.46, Alternative 1 implies that 2,950 AUMs of forage will be gained from treated areas at a cost of $1,398,000. At $1.35/AUM currently reported by the BLM, that is a gain of nearly $4,000 for the amount spent. Alternative 4 (no action) shows a loss of 5,465 AUMs at a cost of nearly $7400 for no expenditure, i.e. $1.4 million.

In debunking Alternative 4, p.46, various figures are cited to illustrate potential economic losses from a No Action alternative. These are prefaced with the statement, "no short-term loss in AUMs would occur, but future losses could result from the annual unchecked spread of noxious weeds." Please note Maps 1-1a through 1-1e, p.3-5, which show the "Noxious Weed Distribution" by state on BLM lands, 1985. Also note Appendix D, p.73, which shows the "Distribution and Spread of Selected Noxious Weeds 1920-1980" for the 5-state EIS area. How successful have these herbicide treatments been in the past? 52-5 What were their cost/benefit ratios? What was their methodology? Where is the data supporting the effectiveness of such programs?

52-6 Furthermore, under "Economic Conditions," p. 30, is this statement, "The average annual cost of controlling weeds on BLM land in the EIS area in 1982 and 1983 amounted to $344,000. How many acres were treated? What methods were used? How is the current proposed program cost of nearly $1.4 million justified?

Adverse Biological Impact

52-7 A Worst Case Analysis is presented only for 2,4-D and Picloram (Appendix W). WCAs should be undertaken for glyphosate and dicamba as well. In view of gaps in relevant information and scientific uncertainty necessitating this process, who will determine if this WCA is adequate. We are especially concerned that there is heavy reliance upon the data of the chemical manufacturers, e.g. Dow Chemical Company and the herbicide Picloram.

The WCA work is mandated only for human health, although forecasts are based upon studies with animals such as mice, rats, and dogs. We are concerned as well about the impacts (short-term and cumulative) of these chemicals upon wildlife, native plants species, and habitat. We are also concerned about 52-8 the failure to monitor the wildlife and habitat base prior to and after chemical treatment.

The DEIS states that there are 25 animal species in the 5-state EIS area (Table 2-1) listed or proposed for Threatened or Endangered status by either the U.S. Fish and Wildlife Service or the states. Another 134 species are listed as special interest or sensitive species by the individual states in the EIS area.

52-9 The DEIS also states that there are 3 federally listed endangered plant species in the EIS area. At least 268 sensitive species are reportedly under review for listing as Threatened or Endangered by either U.S. Fish and Wildlife or by the individual states. We are concerned that the EIS area may not have been inventoried in all cases by a qualified botanist. The DEIS should address this issue.

52-10 We are concerned about the impacts of these herbicides upon wetland and riparian areas throughout the 5-state EIS area, upon the 5 designated Wilderness areas totalling 19,700 acres and the 224 Wilderness Study Areas totalling 5,221,500 acres, and upon the Areas of Critical Environmental Concern.

52-11 On page 2, the text states, "Fourteen noxious weeds have become thoroughly established and are spreading rapidly on public lands in Idaho, Montana, Oregon, Wyoming, and Washington." Public Law 93-629, Appendix A, P.61, describes "noxious weed" as "of foreign origin". The 14 noxious weeds are presumably those listed in Appendix C-1, "Noxious Weed Target Species to be Treated." What is the agenda for those "Noxious and Troublesome Weeds to be Considered for Treatment," also listed in Appendix C-2. Appendix C-3 is a list of "Poisonous Plants of Concern in the EIS Area." The latter appendices, C-2 and C-3, include native species. Again what are the target species of this program?

Conclusion

In conclusion, we feel that the DEIS is heavily biased toward chemical treatment for noxious weeds. Another EIS should be prepared to include an IPM alternative. We oppose aerial herbicide application (Alternative 1) due to unavoidable impacts upon non-target plant and animal species.

In addition, we do not believe that adverse biological impacts upon wildlife, plants, and habitats in the 5-state EIS area from the use of 2,4-D, Picloram, Dicamba, and glyphosate have been adequately identified, as required by the National Environmental Policy Act.

END

RESPONSES TO COMMENT LETTER 52

52-1 The Proposed Action is an integrated pest management alternative. See common issue 1.

52-2 Because noxious weeds already infest thousands of acres of BLM-administered land, preventative measures alone are not adequate. An aggressive program of weed control in currently infested areas is needed to prevent more spread. See common issue 7 and responses to comments 43-47 and 43-13.

52-3 The cost of implementing Alternative 3 would be approximately the same as the cost of implementing Alternatives 1 and 2 as indicated in Table 3-3. The total costs of each alternative were determined from proposed treatment levels (Table 1-2) and treatment costs (Appendix J). No budget cap is set or proposed for the noxious weed control program. The $1.4 million is the estimated cost of implementing the Proposed Action. Also see response to common issue 2.

52-4 See response to comm[illegible] 45-4.

52-5 See response to common issue 2. On the basis of information received in comment letters on the DEIS, the trend maps in Appendix D have been revised.

Where herbicides have been used, post-treatment surveys have shown that BLM has been able to control and reduce weed infestations and in some cases has eradicated weeds by treating them in the first year of infestation with two or three retreatments. Data supporting the effectiveness of these programs can be found in BLM state, district, and resource area offices.

52-6 Approximately 6,500 acres of BLM land were treated chemically over the EIS area in 1983. Helicopter aerial, ground vehicle and hand application methods were used. The main reason the costs would increase from 1983 is because BLM is proposing to treat a significantly greater number of acres. Current program costs have been revised. Also see response to comment 18-1.

52-7 BLM has accepted documentation that dicamba is not mutagenic or carcinogenic. Glyphosate has been added to the worst-case analysis in Appendix H.

52-8 See common issues 5 and 6 and responses to comments 20-2, 21-3, 29-2, and 31-13.

52-9 BLM policy requires a survey of the project site for threatened, endangered, and sensitive species before vegetation treatment or ground disturbance. See page 7 of the DEIS. Also see response to comment 50-2.

52-10 Wetland and riparian impacts are addressed in Chapter 3 of the DEIS, pages 36-38. Impacts on wilderness and special areas are addressed on page 45. BLM's policy for controlling noxious weeds in wilderness and wilderness study areas is described in Chapter 1, Weed Management Treatments and Design Features. Also see response to common issue 1 and comment 16-1.

52-11 See response to comments 7-1 and 45-3.

53

Cooperative Extension Service
MONTANA STATE UNIVERSITY U.S. DEPARTMENT OF AGRICULTURE AND MONTANA COUNTIES COOPERATING
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717

July 30, 1985

Dr. William Leavell
Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
Box 2965
Portland, OR 97208

Dear Dr. Leavell:

The Draft Environmental Impact Statement (EIS) for noxious weed control in five northwestern states provides an objective, in-depth discussion of the environmental and economic impacts that would result from the Proposed Action and the three alternatives. I was very impressed with completeness of the technical information and with the nonbiased method of presentation. The EIS will be of great value in the decision-making process.

The detrimental effects of noxious weeds on animals, humans and the environment are readily apparent in Montana. However, weeds are a slow, silent killer whose effects are often observed indirectly. Failure to control or contain the spread of certain noxious weeds will produce an unsurmountable problem in Montana within a few years. Early detection and containment or control are the only viable alternatives available for weed management on our forest and rangelands.

The Proposed Action, which includes the use of all approved methods of noxious weed control in an integrated program, provides the best short and long term solutions to Montana's growing noxious weed problem. Cultural, mechanical and biological control methods, combined with the judicious use of herbicides furnishes flexible solutions to the wide spread noxious weed problem. It is imperative that we not limit our options to control the onslaught of introduced plant species in our virgin environments, before it is too late.

Please let me know if there is any way I can be of assistance.

Sincerely,

Jim Nelson, Ph.D.
Extension Weed Specialist

JN/cj

The programs of the Montana Cooperative Extension Service are available to all people regardless of race, creed, color, sex or national origin.

54

OKANOGAN COUNTY
CATTLEMEN'S ASSOCIATION
First in Washington

Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

July 29, 1985

Dear Mr. Simmons:

On behalf of the Okanogan County Cattlemen's Association, I would like to offer some comments on the Draft Environmental Impact Statement dealing with the Northwest Area Noxious Weed Control Program. As Chairman of the Noxious Weed Committee of the County Cattlemen's Association, I would strongly encourage the B.L.M. to adopt Alternative 1. The reason for this is simple: The more acreage of weeds treated, the better. The Association Noxious Weed Committee also likes this Alternative because it offers an integrated approach to battling the noxious weeds on B.L.M. property.

Because the livelihood of the Cattleman is greatly dependent on the quality of range, agressive weed control efforts are practiced by nearly every rancher in the business. Over the last 20 years, ranchers in this area have come to realize that weed control is a necessity after watching literally thousands of acres completely overtaken by noxious weeds. And because weeds know no boundaries, it is imperative that the B.L.M. reinstate their weed control programs in the County. To continue to do nothing on B.L.M. lands only worsens the problem for everyone, not just the B.L.M..

After reviewing the Worst Case Analysis provided in the Draft E.I.S., my Committee shares the opinion that the findings are more than sufficient to satisfy our concerns. Picloram and 2, 4-D have both been widely used by Members of our Association for years without incident.

The B.L.M. is responsible for weed control on their property, and our Association is hopeful that you will implement the final E.I.S. as soon as possible. If a rancher ignores land management problems such as noxious weeds, he will eventually go broke. I hope that the B.L.M. and the United States Forest Service don't fall prey to the same type of mismanagement.

Sincerely,

Vern Harkness, Chairman
Noxious Weed Committee
Okanogan County Cattlemen's Association

55

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

In reply refer to: SJ

AUG 1 1985

Oregon State Director
Bureau of Land Management (935)
Attn: R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Sir:

The Bonneville Power Administration environmental staff has reviewed the May 1985, Northwest Area Noxious Weed Control Program Draft Environmental Impact Statement (EIS). Overall, the Draft EIS is organized and well written. The analysis proceeds objectively in acknowledging and discussing the scientific controversy and data gaps regarding health effects of herbicides. The document succeeds in describing relatively technical theories of hazard analysis and toxicity in a clear manner. The following specific comments and suggestions are offered as constructive criticisms.

55-1 1. The use of a one-hit model as described on page 125 and the description of your formula for incident levels of cancer on page 136 are somewhat confusing. The one-hit model assumes that one molecule could cause the cancer. The formula brings the question to mind whether 2, 4-D accumulates over time in the body which would affect level of risk. The formula uses L to represent the number of days in a lifetime of 70 years leading one to possibly think it does accumulate. On page 110 it states that "2, 4-D accumulates briefly" but does not say the length of time "briefly" represents.

55-2 2. By the formula on page 136 it appears the use of ranges for exposure and incident occurrence would be more appropriate. When an individual number is used to identify the risk (e.g. 1 per 100,000 persons) the public tends to put too much confidence in a very speculative result. We suggest that you might provide a range for the risk based on a range of possible exposures and identify a number which seems most probable based on your professional opinion. By doing this you show the public the range of uncertainty and also give them your best estimate of actual happenings. For example, people nearby will be potentially exposed to 50 mg/kg/day to 150 mg/kg/day which makes the range for risk between 0.1 per 100,000 to 2 per 100,000 cancers each year. BLM believes the risk to actually be about 0.5 per 100,000.

55-3 3. Our experience with worst-case analyses is that the public and technical community more readily accept comparison risks if they involve risks that are commonly experienced and deemed acceptable by the general public. Your egg example on page 137 is close but we think it could be improved if the possibility of cancer was tied to common use household cleaners or yard and gardening chemicals.

55-4 4. The discussion of impacts also offers little information that decision-makers can use in choosing methods to avoid or reduce adverse impacts from noxious weed control activities. Although the DEIS mentions on page 7 that pre-treatment surveys will be conducted, there is no information on the actual development of a treatment plan using mitigation features on a site-by-site basis. A list of the mentioned "approved standard and special provisions" would be useful in this document.

55-5 5. We recommend that the discussions throughout the EIS all be consistent in use of terminology for various chemicals. The scientific (generic) name of a particular chemical should be used first, followed (as necessary) with trade names. Appendix E uses the scientific names for various formulations whereas Appendix G uses the trade names of several formulations. To minimize confusing the reader the same approach should be used (we prefer scientific name followed by trade name).

We hope our comments and suggestions will help to make your final EIS more complete. If you have questions, call me at 230-5137.

Sincerely,

Anthony R. Morrell
Environmental Manager

RESPONSE TO COMMENT LETTER 55

55-1 The explanation of the probability equation has been revised (see Appendix B). Also see response to comments 43-27 and 43-20.

55-2 Although ranges in exposure exist and the presentation of such in risk analysis would be of value to some readers, BLM has used maximum exposures because an emphasis on conservatism (i.e., over-estimates rather than possible under-estimates) throughout the document.

55-3 Table B-15 has been revised.

55-4 Standard and special provisions are presented in Appendix I, Design Features, and the discussion of weed management treatments and design features in Chapter 1.

55-5 Appendix G has been changed.

56

IDAHO NATURAL RESOURCES LEGAL FOUNDATION, INC.
"To Restore, Preserve and Protect"
PO Box 1946 Boise Idaho 83701 (208) 343-8978

William R. Meiners
Chairman

L. F. Mehrhoff
Vice-Chairman

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Alan Hausrath

Edwin W. Stockly
Lawyer and
Chief Executive Officer

July 31, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Re: Northwest Area Noxious Weed
Control Program Draft EIS

Dear Sir:

Idaho Natural Resources Legal Foundation's (INRLF) comments on the Draft Environmental Impact Statement for the Northwest Area Noxious Weed Control Program are as follows:

1. The worst case analysis correctly states "Scientific uncertainty exists about the carcinogenicity potential of the herbicides 2,4-D and picloram." Page 123. But the worst case that is analyzed has to do with errors resulting in over exposures of human beings, as opposed to the carcinogenicity of the herbicides. On page 136 it is stated, "It is possible to calculate statistical upper limits on the carcinogenic potential of 2,4-D, utilizing multiple dosage data from Hansen and others (1971)." That statement is in conflict with the statement quoted from page 123. If there is scientific uncertainty as to the carcinogenicity of the herbicide, then it is not possible to calculate statistical upper limits on the carcinogenic potential. The worst case that must be analyzed is that any exposure to 2,4-D or to picloram will cause cancer in the person exposed. If there is scientific uncertainty as to whether that cancer will be caused, then the worst case to be analyzed is that cancer will be caused.

56-1 Certainly it is prudent to anticipate untoward events, such as those depicted in the "scenarios" contained in the worst case anlaysis, but there is no scientific uncertainty connected with those events, nor are the data incomplete. It is the toxic effects that must be analyzed on a worst case basis, and the worst case is that the herbicides are toxic to humans, more toxic than the "estimates." The worst case anlaysis in an Environmental Impact Statement is not a cost-benefit analysis such as that undertaken in a FIFRA registration. Once the worst case has been analyzed, then it is appropriate to give an opinion as to the likelihood of its occurrence. But first the worst case must be fully and frankly described and analyzed.

56-2 2. The DEIS does not discuss the cumulative effects of herbicides. It contents itself with statements such as:

> "The persistence of picloram in soils is considered to be moderate to high because it may exist at phytotoxic levels for a year or more after normal application (Mitchell 1969, NRCC 1974). Picloram persistence in soil is related to both treatment rate and climate. The half-life of the compound has been reported to range from more than four years in arid regions to one month under highly favorable conditions of moisture, temperature, and organic content of the soil (NRCC 1974)." Page 35.

56-3 There is no discussion of the effect of repeated applications of picloram to the same area. What happens to people who year after year are exposed to picloram, who eat animal products where the animal has ingested picloram, who eat material grown on land that has been sprayed repetitively with picloram, and so on? The cumulative effects are required to be analyzed. Quoted above is a statement that picloram may have a half-life of more than four years in arid climates such as the Idaho "desert." How long must it deteriorate before its toxic qualities are lost? There should be some discussion of that.

Picloram has been picked as an example. The same discussion should be had for all herbicides used. For example, how long does a herbicide remain in the air? There are indications in the literature that 2,4-D stays in the air for lengthy periods. For example, Robinson, E. and Fox, L. L., 1978, 2,4-D Herbicides in Central Washington, Journal Air Pollution Control Association, 28 (10):1015. This is of special concern where aerial spraying is to be used and where there is a significant body of literature indicating that 2,4-D is indeed carcinogenic.

3. No program to control noxious weeds is complete without a thorough evaluation of the cause of the deterioration condition of the vegetation that permitted the noxious weeds to establish a foothold.

56-4 Appendix D shows the dramatic increases between 1920 and 1980 of selected noxious weeds. Why has this happened? What does BLM propose to do to make sure that once the weeds are eradicated they will not become re-established? This is at least as important a question as how to eradicate the noxious weeds. It does no good to throw dollar after dollar at a problem if common sense is not involved. For this reason, INRLF considers the proposed noxious weed program ineffective and incomplete.

INRLF believes that the Noxious Weed Control Program should have an adequate worst case analysis and should contain appropriate measures to prevent the noxious weeds from becoming re-established. If this requires a complete change in the usage of the land, then that is what should be done.

INRLF appreciates the opportunity to comment.

Very truly yours,

Edwin W Stockly
EDWIN W. STOCKLY

EWS/ps
cc: INRLF Board Members

RESPONSE TO COMMENT LETTER 56

56-1 The worst-case to human health resulting from the Proposed Action is that the herbicides addressed in Appendix E do cause cancer.

56-2 The text has been revised for clarity. As indicated in Chapter 1, Weed Management Treatments and Design Features, repeated treatment of an area could occur for up to 5 consecutive years. The anticipated effects from such retreatment are addressed in the environmental consequences chapter (Chapter 3). Also see response to comment 43-23.

56-3 The potential cumulative effects on human health from repeated application of picloram to the same area are shown in the worst case analysis. See Appendix E of the DEIS.

56-4 Reasons for the spread of noxious weeds are numerous and include transportation of seed by: wind, animals, vehicles, railroads, humans, water courses, etc. See response to comments 6-1, 6-2, 20-1, 39-14, and 44-2. It is important not only to develop a total long-term integrated weed control program on BLM-administered land but also to strive for cooperative efforts within each state or region.

57

JAN STIVERSON
WEED SUPERVISOR

509/422-5408

OKANOGAN COUNTY NOXIOUS WEED CONTROL BOARD
P.O. BOX 791
OKANOGAN, WASHINGTON 98840

Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

July 29, 1985

Dear Mr. Simmons:

I am writing to offer comment on the Draft E.I.S. covering the Northwest Area Noxious Weed Control Program on behalf of the Okanogan County Noxious Weed Control Board. Because the B.L.M. manages a substantial amount of acreage within Okanogan County, and because the main objective of the Weed Board is the control of noxious weeds, this E.I.S. is of vital interest to the Weed Board.

The Board strongly encourages that the B.L.M. adopt the integrated weed control approach outlined under Alternative 1 of the Draft. It has long been a contention of the Board that no singular method or practice of weed control is in itself sufficient for long-term weed control; but rather that all methods proven to control noxious weeds must be utilized to maintain a successful weed eradication program. The Board feels that alternative 1 is the only alternative which is realistic considering the scope of the noxious weed problem on B.L.M. lands of the Northwest.

Of concern to the Board under the proposed action outlined in Alternative 1 is the biological treatment of 2,245 acres by means of grazing, insects, and pathogens. Although the Board is strongly in favor of the implementation of agressive biological control practices, and has released a number of biological agents on specific weeds within Okanogan County, the Board feels that it should be made clear that host-specific biological weed control agents are not a panacea in the control of noxious weeds. Biological agents are introduced to help control and maintain weed populations at manageable levels. It is not realistic nor practical to consider biological agents alone as a method of "controlling" noxious weeds. For example, research in Okanogan County has shown that over 60% of the Diffuse Knapweed plants tested showed the presence of Europhora Affinis (seed-head flies), but the spread of the weed continues at a most aggressive pace. We

Page Two

are hopeful that the use of herbicides combined with the increasing numbers of Europhora flies will eventually contain the Knapweed at manageble levels.

In regard to the Worst Case Analysis provided by the B.L.M., the Board finds it completely adequate. The Board was pleased that the B.L.M. utililized conservative projection methods in determining the worst case findings. The Board feels that this Analysis, in conjunction with ongoing research of 2,4-D and Picloram sufficiently fills the data gap which existed prior to this E.I.S.. Both Picloram and 2,4-D are widely used in Okanogan County on State, County, and private lands, and it is the sincere hope of the Board that the B.L.M. will soon be able to use these materials on Bureau property within the County.

57-1 The Board feels that the noxious weed distribution charts within the Draft graphically detail the noxious weed problem in the Northwest better than words ever could. As a point of interest, Musk Thistle, Scotch Thistle, and Leafy Spurge are all present in Okanogan County, and these infestations were not reflected in the distribution charts.

The Draft points out that the B.L.M. is charged with the responsibility of implementing noxious weed control programs. Prior to the spray ban imposed upon the B.L.M., the Board had an excellent working relationship with the B.L.M., and together, the two entities were making a great deal of progress toward the control of noxious weeds, primarily Diffuse Knapweed, in Okanogan County. Since the injunction, no effort whatsoever has been made to control noxious weeds on B.L.M. property, and the weeds have been spreading rapidly. In the end, regardless of what method is used to control these infestations, the final result will be a dramatic increase in the cost, labor, and time necessary to control these infestations. In light of this reality, we encourage the B.L.M. to take all necessary steps to ensure that weed control will once again be a reality on B.L.M. lands.

Sincerely,
Jan Stiverson

Jan Stiverson, Supervisor
Okanogan County Noxious Weed Control Board
Box 791
Okanogan, WA 98840
(509) 422-5408

RESPONSE TO COMMENT LETTER 57

57-1 Thank you for the additional information on weed infestations in Okanogan County. (See revised Appendix D in the FEIS.) This information will be addressed in the site-specific analyses and appropriate documentation. See responses to comments 40-19 and 44-2.

58

[illegible]

United States Senate
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, D.C. [illegible]

July 31, 1985

Oregon State Director
Bureau of Land Management
c/o Mr. R. Gregg Simmons
P. O. Box 2965
Portland, OR 97208

Dear Gentlemen:

The noxious weed infestation in Idaho is a serious impediment to the progress of the state's agricultural economy. Consequently, the draft EIS for the Northwest Area Noxious Weed Control Program has been carefully examined. The following comments apply only to the State of Idaho although they are probably applicable to the other Northwest States as well.

I support your proposed action. However, this seems to be a minor response to a major problem. The table on Page 2 of the draft EIS indicates 59,440 acres of weed-infested BLM land in Idaho but the proposed action only projects treatment of 24,564 acres in five states. Appendix H-1 shows that only a total of 8,095 acres would be treated in Idaho this year under the proposed action.

To the best of my knowledge, the EIS provides an accurate description of the probable results of the proposed action. I can detect no prospect of serious adverse environmental impacts from the proposed action, nor would any be expected.

58-1 I'm disappointed in that the EIS does not explain clearly the criteria used to determine the acreage to be treated or the priorities for treatment. Considering the impact of noxious weeds, at least in Idaho, I'm surprised that the control program is not more extensive.

However, I do support your proposed action and urge that it be initiated.

With best regards, I am

Yours for a free society.

Steve Symms
STEVE SYMMS
United States Senator

SS:tlc

RESPONSE TO COMMENT LETTER 58

58-1 Areas with highest treatment priority will include newly identified spot outbreaks, infestations adjacent to private agricultural land, and infestations adjacent to watercourses that would readily spread weed seeds. This is not to imply that treatment will be limited to these areas. If BLM can treat the approximately 8,000 acres proposed for annual control in Idaho, further spread of noxious weeds on public land should be checked and populations reduced to economically tolerable limits. Also see response to comments 12-1 and 15-1.

59

NCAP
NORTHWEST COALITION for
ALTERNATIVES to PESTICIDES
P.O. BOX 375 EUGENE, OREGON 97440
(503) 344-5044

July 31, 1985

Mr. William Leavell
Oregon State Director
BLM Oregon State Office (935)
PO Box 2965
Portland, OR 97208

Dear Mr. Leavell:

Thank you for this opportunity to comment on the Draft Environmental Impact Statement for the Northwest Area Noxious Weed Control Program. The BLM has managed to issue an EIS for a complicated program that covers a huge geographic area in a very concise document which is a difficult task in itself. I hope that these comments will improve the EIS.

59-1 First, some general comments can be made about the DEIS. Nowhere is there an Integrated Pest Management (IPM) alternative for this program. IPM has been defined as a "systems approach to reduce pest damage to tolerable levels through a variety of techniques, including natural predators and parasites, genetically resistant hosts, environmental modifications and, when necessary and appropriate, chemical pesticides. IPM strategies generally rely first upon biological defenses against pests before chemically altering the environment." (Jimmy Carter, 1979 Environmental Message) The preferred alternative is described as an integrated program, but from inspecting it, it appears to be the alternative that is most dependent on pesticides. An IPM alternative would be an alternative that looks to pesticides as a last resort and depends heavily on pest monitoring, evaluation of impact thresholds, various non-chemical control techniques and public education of the users and visitors to BLM lands as the tools to control noxious weeds. Such an alternative would provide a cost-effective, reasonable program that is currently missing from the document.

59-2 I have serious concerns about the reasonableness of the goal of the preferred alternative to eliminate "BLM lands as a noxious weed seed source for the further infestation of nearby nonpublic lands." (statement made on the back of the title page) Although I recognize problems with noxious weeds, eradication of them as a seed source when they are as established throughout the Northwestern states as the DEIS indicates (p. 2) is unreasonable. Since this EIS is to guide the BLM for the next 10 to 15 years, the goals of the program should be to supress the seed sources of noxious weeds where appropriate, not to eliminate the sources.

The way in which the DEIS alternatives are described leaves the most chemical-dependent alternatives as the only reasonable alternative to be considered. Efficacy of control options, economic considerations, and the program benefits are presented with a bias that would make it next to impossible for a manager to do anything but rubberstamp the chemical-dependent alternative. I think much could be done to use public dollars effectively and efficiently to ensure that a manager would actually have a choice among alternatives.

The following points incorporated into an IPM alternative could substantially improve the EIS and allow for better management of BLM lands:

59-3 Describing bio-control more accurately The DEIS describes biological control techniques as unable to adequately control noxious weeds (Summary and elsewhere), as difficult to establish and in short supply (p. 40). A manager reading this EIS would be hardput to justify considering substantial bio-control techniques in a local program. The experience here in Oregon has been quite different from the experiences described in the EIS. Of the 22 insects that have been introduced as bio-contol agents, 16 have been successfully established, 4 are too recent to evaluate their success and only 2 have failed to establish. This is a good history of establishment. Bio-control agents are readily available; there are literally billions of insects and the species can be selected to accommodate the climactic conditions of the geographic area in need. The efficacy of the various agents does vary, but certainly not more than the efficacy of the herbicides listed in Appendix E.

59-4 Incorporating public education into the program The cost of public education would result in benefits representing a substantial savings to the BLM. One target group would be the recreational users and visitors to BLM lands. This group is identified as adversely impacted because of the presence of noxious weeds (pp. 12, 29-30), but there is no documentation for reduction in visitor use. Basic sanitation measures could be implemented to restrict spread of noxious weeds on BLM lands. Users of wilderness areas or wilderness study areas could be educated not to take contaminated feed or to carry seeds into these areas. High use recreational areas could be posted with displays of noxious or poisonous weeds or with bio-control agents, just as the BLM intended to post areas treated with herbicides for noxious weeds (p. 45). Brochures describing weeds could be available as a public service to many types of users. Hunters could be educated in conjunction with hunting safety courses. Basic rules of safety concerning the consumption of questionable plants or fruits could be circulated. If death and adverse human health effects from poisonous weeds is as big a problem as this document indicates (pp. 12, 13), then the BLM should be implementing similar programs to eradicate mushrooms from their lands. It is possible that with a good public education program the need to treat many of the acres described in the DEIS would simply vanish.

A second target group is the users of BLM lands for grazing. Educational efforts to ensure sound grazing management could reduce acreage that needs to be treated. Many noxious weeds get a foothold on disturbed lands, and the spread of noxious weeds could be confined in some instances by management techniques.

A third target group would be the adjacent landowners. From reading the DEIS, it appears that the prevalent attitude is that BLM does not perform proper noxious weed control on public lands. The mere presence of a weed may not warrant this accusation. Certainly, many private ranchers are experiencing extremely difficult economic times, but noxious weeds on public lands are most likely not the most important factor in this hardship. Long-term control of noxious weeds may demand a change of attitude on the part of this target group, and the educational needs of this group are very important. This group is identified numerous times in the DEIS as impacted economically by noxious weeds on BLM lands.

59-5 Generating better economic data More current data should be used in discussing the economic impacts of controlling noxious weeds in the EIS area. For example, the estimates of loss (p. 46) are greatly inflated according to current values for livestock. Figures in July issues of the Northwest agricultural weekly newspaper, *The Capital Press*, are for less than a quarter of the value estimates in the EIS ($55 or $50.50 compared to $250 per head). This difference must be reconciled.

59-6 The DEIS figures 100% loss on infested acreage, but for many weeds, it is unreasonable to assume no grazing on the infested lands (p. 46). Making this assumption certainly inflates the presumed benefits from the program.

The language used to describe the economic impacts is progressively more drastic, even though the same event is being described in each alternative. 59-7 An example is on page 46 where the untreated acreage in Alternative 2 "could" result in death to livestock, whereas untreated acreage in Alternative 3 "would" result in death to livestock. The impacts should remain the same when describing identical situations. 59-8 Another example is Table 1-4 (pp. 12-13) which summarizes impacts by alternative. The impacts under Alternative 1 are stated positively and assume 100% efficacy. There is no question that treatments would work, whereas in Alternative 3 the impacts are all described negatively and there is considerable question that the programs would work. It seems equally appropriate to say that "where chemical measures fail to control weeds, weeds would continue to crowd out and reduce desireable forage and habitat for animals. Toxic plants would harm animals if not controlled with chemical methods." Instead Alternative 1 is presented as a fail-safe alternative. In reality, alternative 1 is akin to a used car, and it is certain to have some problems. The way it is presented makes it hard to buy. An IPM alternative would include benefits from public education programs that might reduce the acreage in need of treatment. These benefits need to be figured into the economics of a program.

59-9 Monitoring more aggressively Current wording in the DEIS does not clearly spell out the need to accomplish pre- and post-treatment monitoring (p. 11). Pest populations need to be monitored to determine the need for treatment and the best method of treatment. Efficacy of all treatments needs to be carefully documented, not just the prescribed burns.

Avoiding riparian zones and wetlands As stated in the DEIS, riparian zones and wetlands are extremely important to wildlife and fish populations. The DEIS discusses mitigating measures to be employed to protect these resources. Buffer strips along streams are an example. However, given the extreme importance of riparian and wetland zones in most of the EIS area, consideration must be made of no treatment at all within these zones. 59-10 Consideration could be made to limit access of other uses (such as grazing) to these areas, thereby limiting the introduction of noxious weeds by restricting disturbance. The cost of treating noxious weeds in these zones and the cost to wildlife and fisheries may far outweigh the benefits of grazing on these areas.

Incorporation of these points in an IPM alternative would certainly strengthen the document and allow for a reasoned choice among alternatives.

There are also some specific points about the wording in the DEIS that need mentioning:

59-11 Human health--page 13 This table states that the greatest adverse effects to human health from the noxious weeds would be from the lack of control of weeds that are hazardous to human health. This assumption is made without adequate documentation in the DEIS and this should be done if this interpretation is to remain.

Representation of EPA registration process--page 14 As stated in the DEIS, the EPA is responsible for registration of herbicides. However, the EPA has unconditionally registered (made a hazard assessment--based on the complete spectrum of toxicological tests mandated by Congress in 1972--that the use of an herbicide will result in no unreasonable adverse effects to humans or the environment from use according to the label) for only a handful of the herbicides currently marketed in the United States. The reason the EPA has not unconditionally registered most pesticides is because there are data gaps in the knowledge about the effects of these products because the registrants have not done the proper testing required of them. 59-12 These data gaps must be disclosed in the EIS (the missing studies could be clearly identified for each herbicide in Appendix K), and the paragraph on page 14 must indicate that there are data gaps.

59-13 Reduction in acreage--page 21 It is unclear why the BLM is shifting from an approximately 173,000 acre annual program (as in 1982-83) to a 25,000 acre annual program. If 5% of BLM's two and a half million acres are infested with weeds, how can the BLM justify such a small program?

59-14 Increase in cost--page 30 Annual cost for regional weed control in 1982-83 was $344,000. Expected first year costs in this DEIS are $1.4 million based on 1984 dollars (p. 46). Can the BLM explain how one-seventh of the acreage could cost four times as much?

59-15 Inadequate surveys of wilderness and wilderness study areas--pp. 30 and 45 The DEIS poses that these areas could be treated aerially with broadspectrum herbicides. These areas have values that cannot be matched on BLM lands which allow other types of uses. Without comprehensive surveys of these resources, noxious weed control in these areas should not be permitted.

59-16 Inadequate surveys of threatened and endangered species--pp. 28 and 40 Ita appears that these species have been identified, but that site-specific surveys may not be accomplished before a program is undertaken. Current wording in the DEIS is for known populations to be analysed, but no assurance is given that the BLM will actually look for those species.

59-17 Description of the social environment--pp. 30-32 This section of the DEIS needs much improvement. As currently written it is most insulting. The DEIS implies that only the public is in disagreement about the use of herbicides and the effectiveness of alternative treatments. There is also considerable scientific debate about these issues. Candid disclosure of that disagreement will ensure that reasonable alternatives can be presented in an EIS. In many cases, it also means that the agency will make the commitment to do the research for the necessary information to resolve the uncertainty.

In the DEIS, the BLM claims that they are in the middle of this controversy. If they were to truly be in the middle, then much of page 32 must be rewritten. For example, the concerns of herbicide proponents are presented as if they are factual and reasonable whereas the concerns of opponents are based in fear and misperception. This is far from the truth. 59-18 Nowhere in the DEIS is there documentation of the severity of the problem of noxious weeds spreading from BLM lands onto other lands. Economic losses from this encroachment is assumed although the DEIS documentation of that is not adequate (see below). There is supposedly great concern for the effect of noxious weeds on native plant species, although there is no documentation or mention of concern for the effects of grazing on native plant species.

In contrast, people who have expressed concern over the effects of pesticides are presented in a very different light. This is possible because the BLM has not adequately explained the problems and shortcomings with EPA registration, the missing data, the abundance of fraudulant and inadequate testing, and the lack of independent scientific review (see attachment A). BLM has not explained the shortcomings of science when evidence is inconclusive or studies are simply missing. As a general rule, those who have raised concerns about herbicide use do so not because they are stupid and don't trust sound science but do so because there are valid scientific concerns about the assumptions and information on which agencies are basing their decisions to procede with large and expensive spray programs.

The statement that "some segments of the public may distrust or reject sound scientific conclusions because they cannot understand the analytical process leading to the conclusions or because they have come to consider all scientific studies concerning herbicides to be inconclusive or dubious" should be accompanied with the parallel statement that "some segments of the public may trust and embrace unsound scientific conclusions because they cannot understand the analytical process leading to the conclusions or because they have come to consider all scientific studies concerning herbicides to be conslusive and sound". Both sides deserve equality in the DEIS, and the BLM must truly be in the middle if that is the position it claims. The implications in the final paragraph in this section should be an embarrassment to the BLM. The statement that fears and anxieties about issues like worker safety and water contamination are directly related to perceptions of scientific uncertainty about the existence of health risks is highly irresponsible. In early 1985 here in Oregon, a backpack spray operator near Rogue River collapsed during a government forest spray operation and had to be evacuated from the unit after he had been using a leaking tank for many consecutive days. Major fish kills and contamination of domestic water supplies have occurred during federal spray operations. These are concerns that many people share regardless of their perceptions of scientific uncertainty and health risks.

Cumulative impacts--The BLM exempts itself from addressing the cumulative impacts of its spray program in conjunction with other programs carried out on lands in that region. 59-19 Examples are on page 32 where noxious weed programs are considered to be minor and on page 37 where contamination resulting from BLM programs is not expected to affect the detectable background herbicide levels in streams. Although no impact is claimed by the BLM for federal contamination of groundwater, the problem from nonfederal lands is noted on page 38.

59-20 Poisonous Weed Chart--page 41 Table 3-2 reads like a poison contol center chart for weeds. A similar chart should be included for poisoning from herbicides with the appopriate disclaimer at the bottom.

59-21 Effects on range animals--page 42 This section states that treatments are at such low rates that livestock will not be affected. A study in New Zealand noted significant increases in tumor rate with phenoxy herbicides, picolinic acid and glyphosate. See K.W. Newell et al. 1984. Phenoxy and Picolinic Acid Herbicides and Small-Intestinal Adenocarcinoma in Sheep. *Lancet* December 8, 1301-1305.

59-22 Economics--pages 46 and 79 The economics section is a best case analysis of the benefits of the program. There is no justification for assuming the exceptional efficacy of the preferred alternative. Appendix E lists the susceptibility of common weeds to various herbicides. Using the maps in Appendix D to identity the most widespread noxious weeds, only spotted knapweed and Canada thistle have an herbicide that will produce excellent control (over 95% control in a single treatment). Russian knapweed, yellow toadflax, and hoary cress have at least two herbicides that can give good control (one treatment per year gives 85 to 94% control), but leafy spurge has only one herbicide option for good control, two herbicides for fair control (60 to 85% control with one treatment) and one herbicide for poor control (10 to 59%). The jobs impact needs better documentation.

59-23 Definitions of terms-- On page 34, the reader could be refered to the glossary for definitions of terms such as phytotoxicity and photodecomposition when the terms first appear in the Air Quality section rather than on the next page under Soil.

59-24 Record of establishment--pp. 92 and 93 *Sphenoptera jugoslavica* is well established near The Dalles, OR and *Hylemya seneciella* is well established in several locations in OR, for example near Mary's Peak.

59-25 Information on 2,4-D--Appendix K The missing data identified by the EPA in their 1980 review needs to be noted in the EIS. 59-26 Editorial comments on the lack of public understanding about mutagenicity does not need to be in this section. If a concept needs explanation, then explain it. BLM decisionmakers will also need to understand this information. 59-27 The importance of lack of data concerning carcinogenicity should be noted. Since the research is deficient, the burden of proof concerning 2,4-D and carcinogenicitey must rest with the pesticide and not with exposed populations. Epidemiological research conducted in Sweden indicates cancer associated with 2,4-D (see Attachment B). There is differing opinion about the harm of the contaminants of 2,4-D (see Attachment C). 59-28 NOELs that are established for a certain effect cannot be said to be a NOEL for the herbicide.

Information on Picloram--Apppendix K 59-29 Any missing data on picloram needs to be noted. The EPA has determined the data base for picloram

(issued a registration standard) so it should not be difficult
for BLM to gather this information. There is scientific
disagreement about the mutagenicity of picloram and
carcinogenicity tests have been equivocal.
59-30 Information on Glyphosate--Appendix K Missing information on
glyphosate needs to be noted. The EIS should not simply adopt
the chemical industry's interpretation of data without close
scrutiny. For example, considering the results of just one
study, it is inappropriate to simply discount the mutagenic and
reproductive hazards of Roundup use. Monsanto's 21-day subacute
dermal toxicity study in albino rabbits (IBT No.A1549, EPA
Succession No. 93847, Fiche Nos. 4-5) demonstrates a clearly
elevated testicular "giant multinucleated cells" in all doses and
methods of applications tested. The report does not further
describe these cells but the mechanism involved is almost
certainly mutagenic and perhaps doubly so. The pathologically
"giant" cells would themselves indicate a genetic disturbance in
the gene controlling cell size, and multiple nucleii suggest some
massive disruption of the genetic process governing cell division
(genetic effects on cell division also suggest caution in
evaluating Roundup's carcinogenic hazard). The fact that the
effect is demonstrated at all dose levels precludes calculation
59-31 of a NOEL. Likewise, finding pesticide-caused abnormal genetic
activity in the testes raises the specter of serious reproductive
effects. Monsanto's failure to point out these effects in its
report to EPA is in itself significant. One of the authors of
this study (Dr. Keplinger)--along with the head of Monsanto's
health and safety research program (Dr. Wright)--was convicted of
multiple counts of submitting fraudulant research reports to the
government.
Worst Case Analysis--Appendix N This worst case analysis proceeds
from the assumption that it needs to be written because of the
uncertainty about the carcinogenicity of 2,4-D and picloram. The
wording of 40 CFR 1502.22 requires disclosure of data gaps and
59-32 scientific uncertainty. The data gaps are not disclosed in this
DEIS, and hence Appendix N is inadequate. The DEIS covers 2,4-D,
picloram and the combination of the two. It is appropriate that
the worst case analysis look at herbicides in combination, if
that is how they will be applied. The positioning at the end of
the analysis of the likelihood of the worst case occuring is also
59-33 appropriate. Using unpublished data or personal communications
for establishing a NOEL in the analysis is not appropriate (e.g.
59-34 Roby, 1984). The Yates and others, 1978 study is not referenced
in the DEIS.

The opportunity to participate in developing BLM programs such as this is important to groups such as NCAP. We appreciate receiving the Draft.

Sincerely yours,
Norma Grier
Norma Grier

RESPONSE TO COMMENT LETTER 59

59-1 Alternative 1, the Proposed Action, is an integrated pest management alternative. See common issue 1.

59-2 See response to comment 15-1.

59-3 The DEIS did not attempt to downgrade biological control techniques in any manner. Biological control is an important tool for stressing, and in some cases controlling weeds. BLM will continue to expand the use of biological agents as they become ready for release to more areas. BLM contacted the following specialists concerning the availability of biological agents in the EIS area: Bob Hawkes and Bob Brown of the Oregon State Department of Agriculture, Bob Nowierski of Montana State University, Bob Callihan of the University of Idaho, and Norm Rees of the USDA, Agricultural Research Service, Range and Insect Laboratory, Bozeman, Montana. See common issue 8.

59-4 Public education is an important step in identifying methods of preventing the spread of weeds. BLM's policy is to assist other agencies, states, counties, and public interest groups in educating the public. BLM participates in weed tours, weed fairs, seminars, public school programs on weed identification, and public information meetings.

59-5 Because livestock values vary from year to year and month to month, they are difficult to keep current. Cattle prices in July 1985 amounted to about 30 cents per pound, and the average weight of a mature cow is 800 pounds. Thus, the average value of a cow in July 1985 was $240.

59-6 In most infestations the reduction in carrying capacity is not 100 percent, but cattle utilization of areas infested by noxious weeds may be reduced by up to 100 percent.

59-7 The number of deaths to livestock would be greater under Alternative 3 than under Alternative 2 because the spread of weeds would be greater under Alternative 3.

59-8 Table 1-4 has been revised to clarify impacts to animals. Public education and awareness are important in any weed control program.

59-9 Conducting pre- and post-treatment surveys is standard BLM procedure as indicated in the DEIS. See response to common issue 5.

59-10 Riparian and wetland areas are extremely important and require special care. Buffer strips and prescribed herbicide application methods are just two ways of protecting the values of these areas. As stated in the DEIS, site-specific analyses of each spray proposal must be conducted, and the results of any analysis may lead the manager to conclude that no herbicide treatment is the best alternative. Also see response to common issue 3.

59-11 Documentation is provided that specific weed species adversely affect human health.

59-12 Both scientific uncertainty and data gaps concerning health effects from use of the herbicides proposed for use are presented in three areas in the EIS: the impacts on human health section of Chapter 3, Appendix K and Appendix N.

59-13 See response to comment 18-1.

59-14 See response to comment 52-6.

59-15 See response to comment 52-10.

59-16 See response to comment 44-26.

59-17 See response to comment 44-43.

59-18 The severity of the spread of noxious weeds is evidenced by the trend maps in Appendix D which have been updated (to 1985) based upon data received in comment letter on the DEIS. Also see response to common issue 2.

59-19 It was not intended to portray the idea that cumulative impacts are not important to ground water although no impact on ground water from BLM's herbicide treatments is expected. Whether a detectable background level of herbicide is present in the ground water or not, detectable increases as a result of BLM's treatments are not anticipated. In surface waters, current detectable background levels are found in the parts per billion levels, and even immediate sampling after treatment normally detects herbicides only in parts per billion. Most tolerance levels are established in parts per million. No significant cumulative impacts from BLM herbicide applications are expected. Also see responses to comments 64-16 and 44-24.

59-20 See Appendix N, Worst-Case Analysis.

59-21 Thank you for the information. The text has been revised.

59-22 See response to comment 43-4.

59-23 Glossary references have been changed.

59-24 The changes have been made in Appendix F.

59-25 The report referenced was an IBT study that has been held in doubt, as have many of their studies. For that reason, BLM has avoided using any IBT data. The missing data have been substantially filled by substituting additional studies. Due to the controversy over 2,4-D, an additional cancer study was required by EPA and is scheduled to be submitted in 1986.

59-26 The mention of "public understanding about mutagenicity" has been rewritten.

59-27 Because of the the lack of agreement or disagreement about data concerning 2,4-D and carcinogenicity, this herbicide was included in the worst-case analysis in Appendix N.

59-28 NOELs can be determined for acute effects, subchronic effects, and chronic effects. NOELs based on chronic effects are most commonly used in hazard analysis.

59-29 See response to comment 59-28 concerning missing data and disagreement about the carcinogenicity of picloram.

59-30 See response to comment 44-35 concerning the carcinogenic potential of glyphosate.

59-31 The data referenced are from the IBT studies. See response to comment 59-26.

59-32 See response to comment 59-12.

59-33 BLM appreciates the concern about the use of personal communications, but had this source of NOEL values not been considered, the much less conservative NOEL of 50 mg/kg/day would have been used.

59-34 The Yates and others 1978 study referenced in Appendix N has been added to the References Cited section.

60

PRESIDENT
Blair Fisher, Rexburg

PRESIDENT-ELECT
Jim Little, Emmett

EXECUTIVE VICE PRESIDENTS
Tom Hovenden, Boise

NATIONAL CATTLEMEN'S ASSOCIATION

Idaho Cattle Association

ICA

2120 AIRPORT WAY

July 31, 1985

R. Gregg Simmons,
BLM Oregon State Office,
P. O. Box 2965,
Portland, Oregon 97208

NORTHWEST AREA
NOXIOUS WEED CONTROL PROGRAM

Dear Mr. Simmons,

The Idaho Cattle Association has a long history of being commited to stronger efforts to control the silent robbers in our state, otherwise known as noxious weeds.

We strongly endorse option or alternative number one in the above Environmental Impact Statement.

Very truly yours,

Tom Hovenden

TOM HOVENDEN
Executive Vice President

P.O. BOX 15397 • BOISE, IDAHO 83715 • 208 / 343-1615 or 344-9482

61

United States Department of Agriculture
Forest Service
Washington Office
12th & Independence SW
P.O. Box 2417
Washington, DC 20013

Reply to: 1950

Date: July 31, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

We have reviewed the Draft Environmental Impact Statement (DEIS) for the Northwest Area Noxious Weed Control Program and have the following general comments.

61-1 In your worst-case analysis, you might want to consider a more extreme but reasonably forseeable worst-case scenario, such as the possibility of a ground vehicle containing 200 gallons of herbicide contaminating a stream or the possibility of a helicopter crash into a populated area.

61-2 The way in which the document is currently written, it appears to justify a decision already made, i.e., to use herbicides on 21,200 acres, manual and mechanical treatments on 1,100 acres, and biological controls on 2,200 acres.

61-3 One point that we believe needs further emphasis is the threat to human health from the noxious weeds themselves. The DEIS discusses the risk associated with chemical herbicides very well. Human health effects from not treating noxious weeds under the no action alternative, alternative 4, page 51, is also good. However, this latter point could be emphasized more in the summary as well as the purpose and need section. You might want to consider displaying the risks involved more clearly in the DEIS so that those who object to use of chemicals to combat toxic plants, which could even lead to death to them or their pets or stock animals, have the opportunity to understand the full implications of the tradeoffs.

Our specific comments are enclosed.

Thank you for the opportunity to review this Draft Environmental Impact Statement.

Sincerely,

David E. Ketcham

DAVID E. KETCHAM
Director of
Environmental Coordination

Enclosure

Specific comments on BLM's Draft EIS
"Northwest Area Noxious Weed Control Program"

p.2, para 3 - Carlson-Foley Act is misspelled. Also suggest defining noxious weed here rather than much later in the document at p.6, para 2.

p.2, para 4 - Extreme confusion results from trying to interpret Maps 1-1a through 1-1e and their relationship with Appendix D. The maps purportedly show total noxious weed distribution in each of the states covered by the DEIS. However, the 1980 maps of selected noxious weeds individually show much more state coverage than total noxious weed distribution in 1985. What populations have not declined from 1980 to 1985!

p.7, para. 6 - What is the definition of "small areas" to be treated in Wilderness study areas?

p.11, para. 9 - The regional programmatic statement is intended to guide BLM's program for the next 10-15 years. It is likely that changes in noxious weed infestation patterns, herbicide and other alternative technology and public concerns will require reevaluation before this time. CEQ in response to the "40 Most Asked Questions" states that EIS's that are more than 5 years old should be carefully reexamined (#32).

61-4 p.14, para. 5 - The statement about EPA's registration responsibilities is not accurate. The EPA administrator can and does register pesticides that "...may generally cause...unreasonable adverse effects on the environment..." but he classifies these for restricted use. See FIFRA Section 3 (d).

p.35, table 3-1 - Dicamba/banvel will readily leach in soils. See appendix K, pg.107.

p.41, Table 3-2 - Death camas misspelled camis.

p.48, para. 4 - hormone (auxin)-mediated, not medicated.

p.49, Table 3-4 - Trade name for dicamba is Banvel.

p.51, para. 9 - False hellebore not falsehelleborne and wild tomato not tomatx.

p.67, para. 1 - End of paragraph is garbled.

p.129, table H-3 and others - Readings titled "mixing errors" should show that they include error for excessive swath overlap.

p.133, para. 3 - Improper citation. Citation is USDA 1984.

Appendix C - Numerous misspellings in tables, e.g.:

C-1 dyers woad not dyers wool

C-2 morning glory not mourning glory
sow thistle not southissle
rush skeletonweed not skeleton weed
skeletonleaf bursage not skeleton leaf

C-3 death camas not camis
St. Johnswort not Johns wort
jimsonweed not Jimson weed

Appendix E - The need for such an extensive list of weeds is questionable since the only weeds proposed to be treated are noxious or poisonous. Paperwork reduction could be achieved by consolidating only pertinent information in this appendix.

Numerous misspellings also occur in the list, e.g.:

Bachelor button not batchelor
Hempnettle not hempnettle
Italian thistle not Italian
Musk thistle not mush
Whitetop not whitetip

Appendix F - For ease in reading, suggest putting each noxious weed in boldface type, followed by scientific information on biological controls.

Appendix G - Suggest using common names of active ingredients for herbicides named on the title page and at the table heading.

Misspellings in the table:

Douglas-fir-menziesii not taxifolia or taxifolia
Alnus not Almus
Mahogany not Mahoxany
Amelanchier not Amelanchigr
Symphoricarpos not Symporicarpus
Medicago not Medicogo

Appendix L - 2,3,7,8-TCDD

Appendix N - In light of recent court rulings the information in this Appendix will need to be discussed more fully in the main text of the EIS.

61-5 Appendix N - A safety factor of 10 is mentioned for accounting for abnormal sensitivity in the affected population. No mention is made of the standard safety factor of 10 for sensitivity differences between species populations. For example, applying animal test data to human populations.

RESPONSE TO LETTER COMMENT 61

61-1 Accident scenarios have been added to the worst-case analysis. See revised Appendix N.

61-2 This method of describing alternatives has been an accepted practice for 6 years. No decision has yet been made. (See Chapter 1, Implementation, Final Decisions.)

61-3 See revised Summary, Table 1-4, and Purpose and Need section.

61-4 The suggested corrections have been made where appropriate.

61-5 See response to comment 44-56 concerning standard safety factors.

62

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA. 22092

In Reply Refer To:
WGS-Mail Stop 423

JUL 31 1985

Memorandum

To: Oregon State Director, Bureau of Land Management, Portland, Oregon

From: Assistant Director for Engineering Geology

Subject: Review of draft environmental statement for noxious weed control in five northwestern states (Idaho, Montana, Oregon, Washington, and Wyoming)

We have reviewed the statement as requested in your letter of June 6.

62-1 In general the analysis of impacts from the proposed noxious weed control program seems well based and logical; however, we suggest that the final statement should also address past and proposed ground-water monitoring to support the risk assessment and should include assessment of the risk and effects of accidental spills of herbicides.

R. [illegible]
for James F. Devine

Copy to: District Chief, WRD, Boise, Helena, Portland, Tacoma, Cheyenne (information only)

RESPONSE TO COMMENT LETTER 62

62-1 Ground water monitoring needs and methods are largely a function of the site-specific situation, involving water table depth, soils, the need for observation wells, springs occurring in the area, nearby recharge areas, and other considerations. If the site-specific analysis determines that a potential exists for ground water impacts, ground water will be monitored.

63

MONTANA PUBLIC LANDS COUNCIL
P. O. BOX 1679 — HELENA, MONTANA 59624
Phone (406) 442-3420

JAMES E. COURTNEY ALZADA CHAIRMAN
RUSSELL [illegible] CHINOOK VICE CHAIRMAN
[illegible] L. [illegible] HELENA SECRETARY/TREASURER
STUART H. [illegible] HELENA ASST. SECRETARY/TREASURER

DIRECTORS
J. B. ANDERSON JACKSON
JOHN F. BAUCUS WOLF CREEK
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GENE ETCHART GLASGOW
JIM ETCHART GLASGOW
WM. E. GARRISON GLEN
JAY NANCE BIRNEY
GEORGE [illegible] ROUNDUP

July 31, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Greg Simmons
P.O. Box 2965
Portland, Oregon 97208

Dear Director:

The Montana Public Lands Council is pleased to offer the following comments on the Draft Environmental Impact Statement for the Northwest Area Noxious Weed Control Program. The Public Lands Council is an affiliate organization of the Montana Stockgrowers, Montana Wool Growers and the Montana Association of State Grazing Districts whose purpose is to represent the interest of livestock producers who utilize Montana's federal grazing lands.

After reviewing the Draft EIS, it appears that Alternative One (the proposed action) is the only alternative we can support. The other alternatives which perscribe limited or non-use of herbicides are completely unacceptable; in our minds they would not in any way help to control the growing problem of noxious weeds on Western BLM lands. Alternative One is supported because it not only controls noxious weeds through the use of herbicides but allows for the use of other non-chemical control measures. Alternative One would be the most beneficial to livestock producers and could possibly increase the amount of available forage by reducing the number of toxic plants in designated treatment areas.

We support the provisions of Alternative One which would allow for the suppression of exotic noxious weeds in wilderness areas. The control of noxious weeds is the responsibility of all landowners and without any type of effort to control or suppress weeds in wilderness areas, we are overlooking the efforts of adjacent private landowners who spend thousands of dollars to control weed problems on their own property. Furthermore, we agree with the Draft's motion that preventive management is highly important in eliminating or retarding the spread of noxious weeds. To get on top of this growing land-use problem, the BLM and other land managers need to proceed with long-term preventive management plans.

Presently, the continued spreading of noxious weeds is reducing the production of desirable vegetation for livestock on much of the BLM lands in Montana. Under the proposed action, it appears that grass production for livestock has the potential

Page 2
Oregon State Director, BLM
July 31, 1985

to increase. We, therefore, suggest the number of treatment areas be increased so grass production can continue to increase and stabilize.

Without some type of chemical control measures, noxious weeds will continue to crowd out and reduce desirable forage for not only livestock, but wildlife as well.

We thank you for the opportunity to offer these comments on the Northwest Area Noxious Weed Control Program and hope they will be given consideration in the final draft.

Sincerely,

Stuart H. Doggett

Stuart H. Doggett
Public Lands Coordinator

SHD:ejr

CC: Dean Stepanek
Montana State Director, BLM

Robert Gilbert, Montana Wool Growers

State of Montana
Office of the Governor
Helena, Montana 59620

TED SCHWINDEN
GOVERNOR

July 31, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

The State of Montana appreciates this opportunity to review and comment on the Bureau of Land Management's (BLM) Northwest Area Noxious Weed Control Program Draft Environmental Impact Statement (DEIS). The attached comments reflect Montana's interagency planning task force's review and concerns regarding the DEIS.

We believe it is important for BLM to institute long-term weed management programs on all lands under its jurisdiction. If weeds are not controlled or contained, they provide a constant source of infestation and economic impact to all adjacent lands as well as to lands downstream. BLM involvement in area-wide or community-wide coordinated management projects is the most practical solution to controlling the spread of weeds in Montana.

We support BLM's efforts to improve weed management techniques necessary to stop the spread of noxious weeds in Montana.

Sincerely,

Ted Schwinden

TED SCHWINDEN
Governor

STATE OF MONTANA
COMMENTS ON THE
BUREAU OF LAND MANAGEMENT'S
NORTHWEST AREA NOXIOUS WEED CONTROL PROGRAM
DRAFT ENVIRONMENTAL IMPACT STATEMENT

OVERVIEW

Because of serious noxious weed problems, the State of Montana believes it is important for BLM to institute long-term weed management programs on all lands under its jurisdiction. The emphasis on cooperative weed control projects on an individual watershed basis is appreciated. Continued cooperation in weed control efforts among state agencies, federal agencies, county weed boards and private landowners is essential for a successful management program.

The Draft Environmental Impact Statement (DEIS) documents the necessity for a noxious weed control program, but may not focus enough on attention water quality, residues and other site specific environmental issues associated with the proposed herbicide use. Although most broad environmental and toxicological questions on specific herbicides have been resolved during the Environmental Protection Agency (EPA) registration process, the DEIS should improve its identification of problems that may arise on specific weed control projects and focus on appropriate mitigation. It would be appropriate for the BLM to consider requiring each District Office to prepare additional site specific Environmental Assessments for each control project.

TREATMENT ALTERNATIVES

64-1 In addition to the "No Action" alternative, the DEIS should also provide an evaluation for the current program. While the worst case analysis is very thorough, the conclusions might be more useful to the public if cancer risks were compared to occurrences more familiar than those listed in Table N-15. 64-2

Montana generally supports the preferred alternative, which emphasizes cooperation between federal, state and local agencies. The preferred alternative proposes an integrated pest management (IPM) approach that uses a combination of biological, mechanical, cultural and chemical techniques to control economically damaging weed infestations. This alternative allows aerial herbicide applications and should be much more efficient in controlling noxious weeds on large areas than other alternatives that limit herbicide applications to ground equipment or prohibit herbicide treatments. However, on small sites or on environmentally sensitive areas, aerial application may not be appropriate.

64-3 More emphasis should be placed on management as a method of weed control. Improvements in plant vigor and range condition may limit the spread of noxious weeds. Pilot projects that examine intensive grazing management for weed control should be initiated. If management efforts fail to achieve adequate weed control, herbicides can be used as a supplemental treatment.

64-4 Preventative management is the best way to limit the spread of noxious weeds. Page 8 of the DEIS states that livestock "should" be confined for several days when being moved from a weed-infested to a weed-free pasture, and that holding pastures and feeding areas "ought to" be closely observed for weed populations. This language leaves a question as to whether these practices will be done.

Grazing of noxious weeds may help prevent their spread, but generally, will not control them. Most animals will not graze noxious weeds and some are toxic to mammals. Since other vegetation is also grazed, the weeds may gain a competitive advantage and create a more serious infestation. However, sheep and goats may be used to selectively graze specific noxious weeds. Grazing and other biological control agents should be used where feasible as a part of the IPM program.

Prescribed burning of tillage operations should be carefully planned, implemented and evaluated to insure that project objectives are met. Burned areas or areas disturbed by mechanical treatments should be seeded with desirable forage species to assist in preventing re-invasion by weeds and to reduce potential runoff and soil erosion. Reseeded areas should be rested from livestock grazing during the initial growth period to insure establishment. As the DEIS points out, leafy spurge and other noxious weeds may regenerate rapidly from their root system following a burn and may out compete desirable species. Although tillage breaks up the rhizomes of creeping perennials, each section of the broken rhizomes may generate a new plant. Such treatments may effectively spread the weeds, if reseeding is not included in the program.

APPLICATION EVALUATION

64-5 The chemical control program proposal would benefit from a more
site specific evaluation of application techniques, drift po-
tential, residues, surface runoff and potential ground water
contamination. Label directions and precautions should be
observed in all cases. The maximum recommended rate of 2,4-D
application to rangelands is 1.9 pounds of active ingredients per
acre (on most labels) rather than the 3 pounds of active ingred-
64-6 ients per acre suggested in Appendix H-2. Similarly, the maximum
rate for broadcast application of Tordon in Montana is 1/2 pound
of active ingredient per acre, rather than 1 pound of active
ingredient per acre listed in Appendix H-2. However, spot
treatments of up to 1 pound of active ingredient per acre are
allowed by Montana Tordon labeling.

64-7 All products proposed for use are "translocated" rather than "contact" herbicides. The term "contact systemic herbicides" mentioned on page 9 and page 142 of the DIES is contradictory and confusing, and should be clarified. These products are more accurately referred to as "foliar systemic herbicides".

DRIFT

64-8 The program should emphasize selection, calibration and operation
of application equipment to minimize drift on a site specific
basis. The wind velocity restrictions recommended in the proposed
program are generally good, but buffer zones need revision based
on local conditions. Spray drift is enhanced during inversion
conditions, so slight winds (over 2 miles per hour) are desirable
64-9 for most spray projects. The illustration of herbicide applica-
tion with a ground vehicle should be revised. Herbicides sprayed
long distances with a high pressure hose are very susceptible to
drift.

64-10 Vapor drift from agricultural applications of 2,4-D has damaged susceptible crops at distances of several miles. Air quality monitoring studies in Canada have shown concentrations of 2,4-D exceeding 1 microgram per cubic meter on a few days each year. These levels are sufficient to damage tree foliage, gardens and susceptible crops.

Particle drift amounts used in the DEIS evaluation seem optimis-
64-11 tic. Drift density downwind from the target area may easily
exceed the deposit density within the target area. Drift esti-
mates should consider the cumulative effects of the many swaths
necessary to cover a target area.

64-12 The BLM should require that all application equipment be properly calibrated before use on chemical control projects. Improper

calibration and drift are major factors contributing to misapplications. Data from fly-ins indicate that many agricultural aircraft deposit less than 50 percent of the spray material on target before adjustment. The average error is 25 percent on uncalibrated ground sprayers. Spray adjuvants may also be considered to further reduce drift and increase plant coverage.

BUFFER ZONES

64-13 A 100 foot buffer zone that is suggested in Appendix I may not be adequate next to sensitive crops, but may be too restrictive near tolerant crops. When establishing buffer strips, managers should consider soil type, slope, herbicides used, surface and ground water, prevailing winds, and other factors. In some situations buffer zones may not be required. Buffer zones should be established on a case-by-case basis. Weeds within the buffer zones must be controlled by spot treatments or other suitable methods. The DEIS should address weed control in buffer zones.

Montana does not have mandated buffer strips for the protection of state waters. Most herbicide labels, however, prohibit contamination of water. Adequate buffer strips should be prescribed for each project to insure that state waters are not contaminated by spray drift.

WATER CONTAMINATION

Surface runoff of herbicide residues from treated areas may occur
under certain conditions. We support the monitoring of water
64-14 quality and aquatic environments proposed in Appendix I. The
DEIS should state when the additional monitoring systems for these
and other resources identified on page 11 will be developed and
implemented. Project budgets should include sufficient funds for
64-15 monitoring activities and residue analysis. Projects should be
modified to reduce potential surface water contamination from

runoff if monitoring studies reveal significant residue levels.

64-16 The DEIS should address the potential for ground water contamin-
ation resulting from the chemical control program proposal.
Ground water contamination by pesticides is an important issue.
Low levels of 2,4-D, dicamba, and picloram have been detected in
the ground water in Montana. The Tordon labeling for Montana
includes a ground water restriction that prohibits application to
permeable soils where the water table is within 10 feet of the
64-17 surface. The DEIS should contain a commitment that chemical
treatments will be avoided on areas with potential ground water
problems identified by further site specific environmental
analysis.

HEALTH

The DEIS's worst case analysis of herbicide residues expected
on forage plants or in livestock and wildlife is good. A more
thorough discussion of herbicide residues and their effects
on fish, wildlife, domestic animals and human health should be
64-18 included in the evaluation of impacts in the DEIS. The maximum
amount of picloram in forage is expected to be 200 ppm according
to Appendix K, but the tolerance level of picloram on forage
grasses is only 80 ppm (40 CFR 180.292). Livestock grazing
64-19 restrictions should be imposed on treated areas, or application
rates reduced so that when the forage is grazed by livestock, it
is below the tolerance level.

There is some disagreement about the validity of a dose-response relationship for carcinogens. Some experts advocate a zero threshold for carcinogens. No observed effects limits (NOELs), margins of safety, and acceptable daily intake levels (ADIs) are irrelevant if the zero threshold concept is accepted. Other experts believe that the risk of cancer is proportional to the amount of exposure. This should be clarified in the impact assessment and in the worst case analysis.

Although the proper use of 2,4-D and picloram presents very little health risk to the public or to applicators, the worst case analysis (Appendix M) contains some misleading and confusing information. An off-target spray deposition of only 1 percent 100 feet downwind of a target area in a 5 MPH wind seems very low, particularly for aerial applications. A 5 percent swath overlap is not unusual, and therefore, is questionable as a worst case characterization. These figures should be reviewed and adjusted if necessary.

64-20 Those charged with controlling noxious weeds on BLM lands should review Montana's state regulations concerning the proper disposal of pesticides and pesticide containers, as well as provide notification to the Montana Department of Health and Environmental Sciences if spraying is proposed for drainages that serve as surface water sources for public drinking water systems.

ECONOMY

We must emphasize the importance of adequate weed management to the economy of Montana. Noxious weed infestations cause serious losses to agricultural producers in Montana through direct competition with crops and by invading rangeland areas. In many areas, noxious weeds have replaced desirable forage, affecting both livestock and wildlife. Weeds are declared noxious by state law because of their well-adapted ability to displace desirable species.

When weeds such as spotted knapweed with allelopahich properties and large seed production potential, and leafy spurge with an extensive root system, invade Montana rangeland, very few desirable species can effectively compete. Spotted knapweed has been found on over 2.5 million acres, and in every county in Montana. At a 25 percent increase in the rate of spread and a 63 percent reduction in forage productivity, it is important to stop the spread now on all private, state and federal lands. Leafy spurge infests over 600,000 acres in Montana and, once established, is impossible to control with any current control methods. Preventing establishment of noxious weeds and containment of weed infestations should be the goals of all land managers.

RESPONSE TO LATTER COMMENT 64

64-1 Alternative 1 would be the current program if herbicide use was permitted. Since the court order has been in effect, a program similar to that described for Alternative 3 is ongoing in the states of Idaho, Oregon, and Washington. In the states of Montana and Wyoming the current program is similar to Alternative 1, however, fewer acres are treated with herbicides.

64-2 The section of the worst-case analysis which compares cancer risks to other occurrences has been revised.

64- See response to comments 6-1 and 43-47.

64-4 See response to comment 43-13.

64-5 The detail you suggest including in this analysis is appropriately addressed in site-specific analyses and documentation at the state or district office level.

64-6 Before any herbicide can be applied on BLM-administered lands, the latest EPA and 24(c) labels must be obtained and followed to ensure that the application is consistent with instructions on the labels. Appendix H-2 does not distinguish between broadcast and spot treatments; it only states that the maximum rate of application of Tordon would be 1 pound of active ingredient/acre.

64-7 Glyphosate is a contact herbicide with systemic action, which is sometimes referred to as a foliar systemic herbicide. See the revised Chemical Methods section in Chapter 1.

64-8 See response to common issue 3.

64-9 This illustration has been revised.

64-10 These types of effects are not expected to occur from the proposal for several reasons. First, there would be only 5,900 acres treated aerially over the EIS area. Second, the application rate is greatly reduced from maximum allowed rates. Third, application would be selective rather than broadcast over large contiguous areas. Lastly, BLM incorporates many other design features (Appendix I) to protect against such occurrences.

64-11 Sometimes several swaths are needed to cover a given project area with herbicides. The analysis (page 128 of DEIS) does consider that 5 percent of the land sprayed on any individual project is sprayed twice due to swath overlap.

64-12 The proper calibration of application equipment is a BLM requirement.

64-13 See response to common issue 3.

64-14 See Requirements for Further Environmental Analysis, Chapter 1. Site-specific analysis at the state or district office level will determine the type and timing of monitoring. Also see common issue 5 concerning monitoring.

64-15 BLM agrees with your statement that "Projects should be modified to reduce potential surface water contamination from runoff if monitoring studies reveal significant residue levels." If results from monitoring a project indicate that the environment is being affected in a way that wasn't anticipated, BLM would use the data to modify that project or any later project of that nature. Also see the Weed Management Treatments and Design Features section of Chapter 1.

64-16 Detectable effects on ground water from BLM's herbicide treatments are not expected. Site-specific analysis and documentation prior to treatment would determine if there is potential for affecting the ground water and the resulting mitigation needed to reduce or eliminate that potential effect. Also refer to common issue 6 dealing with normal size of BLM treatments. Since most of BLM's treatments are relatively small (less than 10 acres) the potential for affecting the ground water is already slight, but with the additional analysis and preventative measures, the potential is reduced.

64-17 It is the purpose of the site-specific environmental analysis to determine the existence of those areas and modify or preclude chemical treatments to protect these resources.

64-18 Livestock grazing restrictions as stated on the label will be complied with. The 200 ppm (parts per million) residue discussion in the picloram hazard assessment (Appendix K) was presented as hypothetical forage situation for grazing cattle. Initial residues of picloram on forage are not expected to exceed 150 ppm, which would rapidly decrease. Getzendaner and others (1969) reported that picloram residue levels in or on grass rapidly decrease, with the average specific residue being below 150 ppm/lb/acre at application and decreasing to less than 50 ppm in 3 weeks.

64-19 Livestock grazing restrictions would be imposed according to the herbicide label restrictions.

64-20 This is a part of BLM standard procedures (BLM Manual 9222).

65

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

August 14, 1985

Mr. William G. Leavell
Oregon State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Leavell:

This is in reference to the the Draft Environmental Impact Statement for Northwest Area Noxious Weed Control Program. Enclosed are comments from the National Oceanic and Atmospheric Administration.

We hope our comments will assist you. Thank you for giving us an opportunity to review the document. We would appreciate receiving two copies of the final environmental impact statement.

Sincerely,

David Cottingham

David Cottingham
Ecology and Conservation Division

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

ENVIRONMENTAL & TECHNICAL SERVICES DIVISION
847 NE 19th AVENUE, SUITE 350
PORTLAND, OREGON 97232-2279
(503) 230-5400

August 5, 1985 F/NWR5:601

William G. Leavell
Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Re: Attention Mr. R. Gregg Simmons - DEIS Northwest Area Noxious Weed Control Program

Dear Mr. Leavell:

We have reviewed the subject Draft Environmental Impact Statement (DEIS) and suggest the document be strengthened by adding more detail on potential impacts to anadromous fish. The anadromous fish resource represents a major public investment in the Northwest and a resource of international importance. Based upon these factors, we believe the potential impact of the proposed program on anadromous fishes warrants a more thorough discussion in the DEIS.

Anadromous fish, in one life history stage or another, are present in Northwest streams virtually every month of the year. A discussion of the various species present in streams and life history stages potentially impacted would help in evaluating the proposed program. A clearer or more specific description of the geographic areas to be treated would improve understanding of potential impacts. We are confident there are additional studies and data on potential impacts of herbicides on aquatic life not referenced in this document that would better profile potential impacts on anadromous fish. A more specific discussion relating to potential treatment methods and times, as they might impact the aquatic environment, would strengthen the document.

Specific Comments

65-1 Summary: The second page of the summary, second paragraph under "Animals" states: "Game fish populations would not be adversely affected by any alternative,..." We are unable to find sufficient information in the DEIS to support this statement.

65-2 Page 12 and 13, Table 1-4 Summary of Impacts by Alternative: The statements under "Existing situations" and "Alternative 1 (Proposed Action)" would have more credibility if more definitive information was provided on amount of area to be treated near live streams and protective measures to be used to prevent drift and overspraying. The information should address a real application and vehicular/back pack application.

65-3 Although the text on page 9 contains some minimum controls for boom sprayers and broadcast spreaders near live streams a policy statement or set of minimum BLM standards for weed control near live streams would be preferred. A statement of BLM standards for protecting streams and riparian areas should replace the statement "Buffer zones (see Glossary) to protect water resources would be provided according to individual state regulations and guidelines.

65-4 Page 28 and 29 - Fish: The section should be expanded to address anadromous fishes. Both salmon and steelhead spawning times would expand the generalized spawning times listed in the text. Juveniles of both salmon and steelhead are present virtually every month of the year and spawning periods for all species may cover a time period from August through February.

65-5 Page 44 - Impacts on Fish: The statement is made that "Incorporation of design features (Appendix 1) under Alternatives 1 and 2 would eliminate any adverse impacts from applying picloram. Likewise, use of dicamba, glyphosate, and 2,4-D as proposed should cause no adverse effects." A clear definition in Appendix 1 of BLM Standards, not unspecified State Standards, and BLM monitoring controls, where contractors are involved, would strengthen the DEIS conclusions.
65-6 Further, a reference to the estimated amount of stream area potentially impacted and general times of application would assist in interpreting the conclusions stated in this section.

Page 101 - Appendix 1 - Project Design Features: Under the "Application Contract Requirements" section a higher degree of confidence could be obtained with a description of how BLM will monitor the contractors to ensure the listed standards are met.

65-7 Item 8, page 102 states that aerial spraying would be prohibited when "reduces (sic) or wind velocity exceeds 6 miles per hour". On page 9, top right-hand paragraph, the statement is made that spraying will not be conducted in riparian areas when wind velocities are above 5 mph. It is unclear whether an error in standards has been made or if wind velocity standards are different between general areal spraying and spraying in riparian areas.

We would suggest the following improvements be considered to strengthen the DEIS:

1. Existing sections of the DEIS dealing with fish, (pages 12, 27 and 44) should be expanded to more clearly reflect anadromous fish concerns and explain the critical life history elements potentially impacted.
2. A more definitive description of the areas of potential treatment, both location and size of area, where anadromous fish might be impacted should be included in the DEIS.
3. The DEIS should include an expanded discussion on potential impacts to the overall aquatic environment to include aquatic macro invertebrates and plants (both macrophytes and algae).
4. An expanded discussion of the potential impact of the proposed herbicides on salmonids would help in evaluating impacts.
5. Guidelines and standards that have been or will be established and enforced by BLM for the application of herbicides near water bodies and riparian areas should be included as part of the DEIS.
6. BLM procedures for monitoring and insuring that contractors perform to BLM standards should be a part of the "Application Contract Requirements" Section, page 101.

Our general concern with the DEIS is not that the conclusions are in error but rather that the data and information contained in the DEIS does not provide a basis for verifying the conclusions drawn. We feel the additional information would provide a much stronger and more defensible document.

If you have questions regarding our assessment or need additional information please contact Mr. Rollie Montagne, (503) 230-5425, of my staff. Your continuing coordination efforts are appreciated.

Sincerely,

Dale R. Evans
Division Chief

cc: Wayne Elson, Environmental Protection Agency - Seattle

RESPONSE TO COMMENT LETTER 65

65-1 The conclusions of impacts on animals in the summary are supported by several sections in Chapter 3, Environmental Consequences. The analysis of impacts on wildlife and fish is supported by the analysis of impacts on water, soils, and vegetation. Fish populations would not be adversely affected.

65-2 It is not feasible or practical for us to determine the total number of acres to be treated along live streams over the next 10-15 years. Guidelines on buffer zones will vary by application methods. Also see response to common issue 3, buffer zones.

65-3 See response to common issue 3.

65-4 A site-specific analysis and appropriate documentation will address anadromous fish when they occur in the vicinity of proposed projects.

65-5 BLM monitoring controls, where contractors are involved, are discussed in item 12 on page 102 of the DEIS. Contractors will be required to abide by the design features of this EIS and any additional site specific requirements, along with respective state laws and regulations as they apply to the application of herbicides.

65-6 Without knowing precisely where the individual treatment areas are, a total amount of stream area potentially affected cannot be projected. Site specific analysis and documentation conducted at the state or district office levels will define these areas and provide for proper mitigating actions.

65-7 The 6 miles per hour (mph) figure in item 8 on page 102 of the DEIS was a misprint. The figure should be 5 mph. The correction has been made.

66

CooperativeExtension
of Washington State University

FerryCounty Courthouse, P.O. Box 345
Republic, Washington 99166-0345
509/775-3161, Ext. 336 & 337

August 2, 1985

Oregon State Director
Bureau of Land Management
c/o R. Gregg Simmons
P.O. Box 2965
Portland, Oregon 97208

Subject: BLM EIS Comments

Dear Sirs:

I am pleased to see the separation of noxious weed control from other vegetation control measures in your EIS. I feel this is an important step to help prevent noxious weed control from being limited in the future because of court disputes over competing vegetation management for timber plantations.

66-1 I am disappointed in the low amount of acres to be treated for noxious weeds in Washington. I especially feel its imperative to control all noxious weeds, especially knapweed, along all road corridors to contain their spread.

66-2 Another point to be made is that Ferry County, Washington should be darkened in for the following weeds in Appendix D:

Canadian Thistle
Leafy Spurge
Russian Knapweed
Spotted Knapweed
Dalmation Toadflax
Yellow Toadflax
Hoary Cress
Diffuse Knarweed
Common Tansy
Yellow Star Thistle
Musk Thistle
Scotch Thistle

as we have all of these infesting at least some areas of our county.

66-3 I also feel the enviromental consequences if noxious weeds are not controlled should be stressed to a greater extent, especially the decrease and in some cases elimination of wildlife habitat and forage for animals as large as elk to as small as rodents and birds. With reduced habitat for these foraging species could come their reduced numbers thus reducing the food supply for their predators such as raptors, foxes, coyotes, etc. The effects are multiplying and far-reaching.

I'm glad to see you addressing the problem, but an increased emphasis would be appreciated.

Sincerely,

Daniel L. Fagerlie

Daniel L. Fagerlie
Cooperative Extension Agent

DLF/ar

RESPONSE TO COMMENT LETTER 66

66-1 There are approximately 25,000 acres of BLM lands infested with noxious weeds in Washington State, of which BLM proposes to treat an estimated 1,800 acres annually. This treatment level should control spread and diminish infested acreage. Priorities of weeds and areas to be treated will be coordinated at the local level.

66-2 Thank you for your information. See revised Appendix D and response to comments 44-23 and 44-2.

66-3 See revised text, Chapter 3, Impacts on Wildlife.

67

Idaho Wool Growers Association

P.O. BOX 2596 • I.B.ST. CENTER – SUITE 205 • 802 WEST BANNOCK • BOISE, IDAHO 83701 • PHONE 208-344-2271

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Marvin Cox
President
Castleford

Jeff Siddoway
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Stan Boyd
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Boise

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New Plymouth

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Everett DeCora
Salmon

July 31, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2695
Portland, OR 97208

Dear Sir,

The Idaho Wool Growers Association would like to take this opportunity to comment on the "Northwest Area Noxious Weed Control Program" environmental impact statement. This association supports Alternative #1 (the proposed action). It is our belief that every technological and environmentally sound application should and must be applied to stop and/or eradicate the spread of noxious weeds on federal, state and private lands.

Of particular concern to this association are the guidelines governing the control of noxious weeds in BLM wilderness study areas. These areas possess the potential for habouring noxious weed seed stock that will plaque our federal, state and private land managers for decades to come. Guidelines for BLM-WSA's must be flexible enough to allow immediate and effective action if warranted.

67-1 Page 7, column two, under "Weed Management Treatments and Design Features" states "BLM's policy is to carry out a control program, but only in small areas" (W.S.A.'s). If a serious noxious weed problem exists in these W.S.A.'s, the BLM should be free, indeed required, to act immediately in the most efficient and effective manner possible to control the problem. Also stated in this section is "noxious weeds may be grubbed or controlled (we hope these means aerial application is also allowed) with chemicals, provided the control can be effected without seriously impairing wilderness values". We submit that the presence of noxious weeds have a far greater potential of impairing wilderness values (economic as well as recreational) than the control measures.

Noxious weeds must be controlled on all lands managed by the BLM, including W.S.A.'s. A map overlay showing B.L.M.-W.S.A.'s in Idaho with the map on page 3 of the document illistrating noxious weed distribution reveals a large percentage of the areas coincide.

Oregon State Director
Page 2.

The Idaho Wool Growers Association is concerned in regards to the health of our rangelands. We will continue to seek legislation and/or regulations that will allow our competent land managers to care for our natural resources in the most cost effective and efficient manner possible.

Sincerely,

Stan Boyd

Stanley T. Boyd
Executive Director

STB/dm

RESPONSE TO COMMENT LETTER 67

67-1 BLM policy on noxious weed control in wilderness areas and WSA's is flexible enough to allow for effective action to be taken against weeds without detracting from wilderness characteristics. The policy does allow the option of using herbicides.

68

The Nature Conservancy

Tom Wolf
Protection Planner
719 Brookhaven Court, Suite D
Fort Collins, Colorado 80521
(303) [illegible]

August 7, 1985

William G. Leavell
Bureau of Land Management
c/o Greg Simmons
P.O. Box 2965
Portland, Oregon 97208

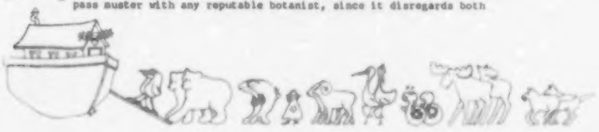
Dear Greg:

Thanks for the chance to comment on the Northwest Area Noxious Weed Control Program DEIS. I apologize for being a little late with this letter, but I do have some serious problems with the DEIS.

68-1 Even if I looked only at Wyoming, I would have to say that BLM has bitten off more than it can chew in your document. The application of herbicides on the scale you propose would adversely affect the many rare animals, plants, and plant communities in the state. Nor do you adequately treat alternative means of weed control. For these reasons, I cannot support any of the proposed alternatives, and I urge you to make substantial changes before you go any further with this ill-conceived project.

Let me give you an example: Rorippa calycina. This taxon is known only from a few reservoir edge sites in Wyoming, plus one site in Alaska. It is surely on the Wyoming BLM's "sensitive" list, which your document refers to on pp. 25-26. Since reservoir edges are the kinds of disturbed sites where weeds flourish, spraying programs also tend to flourish there. To deal with these problems, we have been in touch with Wyoming BLM and with the Bureau of Reclamation office in Denver to be sure that all known Rorippa sites are avoided in spraying programs. 68-2 This is the kind of specificity you will have to aim for in your DEIS. Of course, this will be a formidable task, but you can and should make use of the Rocky Mountain Regional Heritage Program's data base to achieve the needed level of detail. Then you can also go to The Nature Conservancy's state Heritage data bases, such as the one in Oregon. This would be a simple way to repair one of your document's defects: it shows little sign of contact and consultation with experts on rare species--precisely the need Heritage programs are designed to fill.

68-3 Two other problems: 1) Your lack of any monitoring studies on native vegetation means that you have no way of evaluating the fffectiveness
68-4 of your programs. 2) Your definition of what a "weed" is would not pass muster with any reputable botanist, since it disregards both



the concept of natural communities and a land manager's goal of maintaining these communities.

I would be happy to work with your staff in applying a more precise definition of "weed" to the areas of Wyoming where our data base tells us we have plants, animals, and plant communities rare enough to be classified as "sensitive."

I would strongly suggest that you start over with the present document, proceeding on a state-by-state basis, since that is the way you will best find access to the information so sadly lacking in your DEIS.

You can get in touch with our Rocky Mountain Regional Task Force at 1370 Pennsylvania St., #190, Denver, CO 80203. 303-493-1407. This computerized data base ought to prove a useful tool in your thorough revision of the present document.

Thanks for the chance to comment.

Yours,

Tom Wolf

Tom Wolf

RESPONSE TO COMMENT LETTER 68

68-1	See response to comment 33-1.
68-2	See response to comment 44-26.
68-3.	See response to common issue 5.
68-4	See response to comment 7-1.

69

NATIONAL WILDLIFE FEDERATION
Northern Rockies Natural Resource Center
240 N. Higgins, Missoula, Montana 59801
(406) 721-6705

August 9, 1985

Oregon State Director
Bureau of Land Management (935)
Cor. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Mr. Simmons:

Enclosed are the National Wildlife Federation's comments on the Bureau of Land Management's noxious weed control program for the Northwest area. Please excuse the delay in submitting these comments. Summertime is very busy for our office, and we were unable to complete them by the August 1 deadline. However, we are interested in the issue of noxious weed control and hope you will accept these comments in good faith after the deadline.

We look forward to your consideration of these comments and hope that you will incorporate them where appropriate in the final Environmental Impact Statement.

Yours very truly,

Tom France

Tom France

TF/lrr

COMMENTS ON NOXIOUS WEED DEIS
Bureau of Land Management

I. The Noxious Weed Control DEIS Addresses Symptoms, Not Causes.

A. What initially caused the spread of weeds?

1. Overgrazing: When animals consume more than 50% of a plant, the plant loses its vigor. Repeated overuse of the plant weakens its ability to compete with other less platable plants. Vegetation is also removed by trampling, and loss of soil through run-off and erosion. Loss of vegetation and soils contribute to increased aridity and salinity of soils because ground water leaches upward, where it readily evaporates and deposits salts on ground surface. The DEIS
69-1 needs to fully address the problems of causation before
deciding on a course of action.

Plants such as sage and rabbit brush are prevalent in such areas because they don't require much water or good soil. How badly an area has been overgrazed will effect the rate of recovery of native grasses (how much soil and moisture is available?). Equally important is resting the pasture. If the grasses are not given time to re-establish, and are not properly grazed after revegetation, the weed problem has not been solved.

69-2 The DEIS seems to assume grazing will continue during the implementation of the program (See p. 42, chemical treatments applied in the presence of livestock).

The DEIS also assumes an increase in AUM's under the proproposed action (at 46). This is unreasonable because overgrazing heavily contributed to the problem in the first place. (The DEIS at 46 states that the increase is based on the assumption that no livestock currently graze the infested area--no support is given for this assumption.)

69-3 2. Roadbuilding and Development: These forms of ground disturbance, especially roading, has led to a marked increase in noxious weeds--knapweed in particular. The DEIS states at 67, App. B., that the impact of roading is beyond the scope of the DEIS. Such a discussion is necessary to the evaluation of preventative maintenance in any weed control program, and should be discussed.

3. Sodbusting: Plowing up prairie and the failure to use strip contour plowing has led to rapid soil erosion and the introduction of shallow root plants such as sage and bindweed. As with overgrazing and roading, proper farming techniques must be a part of preventative maintenance and should be addressed in the DEIS. In sum, weed control efforts are doomed to failure unless the causes of noxious weeds are understood and addressed.

II. Issues Which Must Be More Fully Analyzed the DEIS.

69-4 1. Funding: The DEIS assumes the BLM has adequate funding to implement the final decision. What if the funding is insufficient? Where will the budget cuts be made? There is no outline (except App. J) of total program costs, e.g. what proportion of funds are dedicated to monitoring, field work, and administration.

69-5 2. The DEIS Fails to State How Revegetation Will Be Accomplished: Will BLM reseed native grasses? Will BLM rely on natural revegetation? How will soil erosion be minimized after weed removal? These issues need to be more fully addressed in the DEIS. Futhermore, grazing should be curtailed on treated areas until new vegetation has a chance to reestablish itself.

69-6 C. Monitoring: (App. I at 102). Monitoring guidelines should be specific and mandatory. What happens if problems arise in the program? (Water quality, degradation, fish kill, decline in wildlife diversity, failure of revegetation, etc.) The BLM must commit itself to mandatory monitoring before any spaying occurs.

69-7 D. Effort Must be Made to Avoid Spraying Ephemeral Stream Channels. (p. 37, Impacts on Surface Water). This is particularly important in eastern Montana where most of the stream channels are ephemeral. Since the proposed phenoxy herbicides tend to persist in non-organic soil and are highly mobile, there is a greater chance of chemical "pulsing" when sudden storms produce concentrated run-off in the stream channels. This run-off will contain higher concentrations of herbicides and may adversely affect wildlife, livestock and ground water.

69-8 E. Timing for Spraying and Burning. Since these activities will destroy wildlife cover and food sources, weed control should not take place during critical development periods for wildlife such as nesting, fawining and calving seasons. This is probably difficult to coordinate because control has to occur in the springtime at the beginning of the plant's cycles. The issue of timing must be addressed. All effort should be made to avoid wildlife nesting, fawning, and calving areas. Guidelines for such control should become a mandatory part of the spraying program.

69-9 F. Site Specific Guilelines: The DEIS does not state what factors will be considered in determining what control method and chemical type will be used in various environments. A more specific analysis of local climate, soil type, weed prevalence and non-weed vegetation is needed to produce guidance in local spraying decisions.

69-10 G. Wildlife Impacts: The DEIS has virtually no analysis of the adverse impacts of the program effects on wildlife and fish (See pp. 43-44). This is entirely unsatisfactory under NEPA since wildlife impacts are important. While forage production is a commendable goal, it should not be an end in itself to the detriment and exclusiton of wildlife and plant diversity. Many animals are dependent on broadleaf plants for both food and shelter. Since herbicides are directed at broadleaf plants rather than grasses, the DEIS should specifically analyze the loss of these plants at the expense of wildlife habitat. A "short term" (10 year) loss of food and shelter would have significant affect on wildlife populations.

RESPONSE TO COMMENT LETTER 69

69-1 See response to comment 43-47 and common issue 7.

69-2 The text has been revised. Grazing restrictions would be applied according to herbicide label restrictions.

69-3 See response to comment 43-14.

69-4 BLM does not assume that there will be adequate funding to implement the final decision, but adequate funding to implement each alternative was assumed for purposes of analysis. If funding is insufficient to implement the final decision, then reduction in all phases (monitoring, acres treated, administration, etc.) would occur proportionately.

69-5 Revegetation will not be necessary in most areas. With the exception of glyphosate, the chemicals proposed for use will only kill broadleaf plants, leaving grasses unharmed. Glyphosate is proposed for use in small, scattered tracts totaling 147 acres along waterways over the entire EIS area. Soil erosion is not expected to be a long-term problem under any control method. Also see responses to comments 6-1 and 6-2.

69-6 See response to common issue 5.

69-7 See responses to common issue 3 and to comment 44-22.

69-8 See response to comment 34-13.

69-9 Many factors are noted in the DEIS. Chapter 1 and Appendix I include a discussion of pre-treatment surveys, and design features to be incorporated. Site specific analysis and appropriate documentation will address these factors and others on a project basis.

69-10 See response to comment 29-2.

70

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION, CORPS OF ENGINEERS
P.O. BOX 2870
PORTLAND, OREGON 97208-2870

August 13, 1985

REPLY TO
ATTENTION OF:

Environmental Resources

Mr. R. Gregg Simmons
Oregon State Director's Office
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Simmons:

We have reviewed your Draft Environmental Impact Statement for "Northwest Area Noxious Weed Control Program" and we have no comments regarding Corps of Engineers activities for the North Pacific Division involving Portland, Seattle, and Walla Walla Districts.

Thank you for the opportunity to review and comment on this document.

Sincerely,

D. E. Olson
Chief, Planning Division

71

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

AUG 19 1985

REPLY TO
ATTN OF: M/S 443

William G. Leavell
Oregon State Director
Bureau of Land Management (935)
P.O. Box 2965
Portland, OR 97208

Dear Mr. Leavell:

In accordance with our responsibilities under Section 309 of the Clean Air Act, we have reviewed the Draft Environmental Impact Statement (DEIS) for the Northwest Area Noxious Weed Control Program. This DEIS is a programmatic statement for controlling noxious weeds on Bureau of Land Management (BLM) administered lands in Idaho, Montana, Oregon, Washington, and Wyoming and is intended to guide the program for the next 10 to 15 years.

Under the preferred alternative, BLM plans to aerially apply the herbicides picloram and glyphosate on range land. These herbicides currently are not registered for range land use in the states covered by the DEIS. Registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) would be necessary to use these pesticides.

The scientific discussions on human health effects, exposure assessments, and risk characterizations are well presented. However, some evidence has recently arisen to indicate that glyphosate poses risks of oncogenic effects. This evidence is in the process of further evaluation. The information currently available indicates that significant risks to human health are not expected from the level of glyphosate to which humans are likely to be exposed.

A risk analysis of accidental spills should be included in the Final EIS. The risks to biota as well as human health should be included in the worst-case analysis. Additional documentation and evaluation of water quality impacts is needed in the Final EIS.

Based on our concerns on the worst-case analysis and potential inconsistency with FIFRA, we have rated it EO-2 (EO: Environmental Objections; 2: Insufficient Information). Enclosed is a copy of our review report. It includes a detailed description of the oncogenicity evidence on glyphosate, the actions underway to clarify this issue, and the details of our other concerns. The information and analysis requested should be readily available to satisfy our objections. We have also enclosed a summary of our rating system. We have related our concerns by telephone to Phil Hamilton and Dale Bays of your staff.

Thank you for the opportunity to review this report. We recommend that you contact Tom Adamczyk (FTS) 557-1650 at EPA's Office of Pesticide Programs in Washington, D.C., if you have any questions concerning the registration of picloram and glyphosate. You should also contact James Roelofs at (FTS) 557-7102 to monitor developments in glyphosate over the next few months, since information on the status of glyphosate oncogenicity will need to be reflected in the Final EIS. If you have any other questions concerning our comments, please contact Wayne Elson in the EIS and Energy Review Section in Seattle at (FTS) 399-1463.

Sincerely,

Ernesta B. Barnes
Regional Administrator

Enclosures

U.S. ENVIRONMENTAL PROTECTION AGENCY
REVIEW REPORT
ON THE NORTHWEST AREA NOXIOUS WEED CONTROL PROGRAM
DRAFT ENVIRONMENTAL IMPACT STATEMENT

FIFRA REGISTRATION

71-1 Under the preferred alternative, the Draft Environmental Impact Statement (DEIS) proposes to aerially apply picloram and glyphosate. The DEIS does state that registered herbicides will be used according to label directions and restrictions. However, neither
71-2 picloram nor glyphosate is registered for use on range land in the states covered by the proposed weed control program. Thus, to use either pesticide on rangeland in these Northwestern States, some form of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) would be necessary. The possibilities are: regular registration under FIFRA section 3; registration by a State to meet special local needs, under section 24(c); or, emergency exemption under section 18. All labels need to be carefully checked to be sure that they are registered in each state for range land use.

71-3 The Final EIS should identify which states picloram and glyphosate are not registered in for range land use to ensure compliance with FIFRA.

SUMMARY OF GLYPHOSATE ONCOGENICITY INFORMATION

71-4 The following recent evidence on glyphosate should be reflected in the Final EIS.

A treatment-related increase in the incidence of renal tumors has been found in a chronic mouse feeding study conducted with glyphosate. The tumors (renal tubule adenomas) occurred in three out of 50 male mice fed a diet containing 30,000 parts per million (ppm) or 3 percent glyphosate. The same type of tumor was also found in one of 50 animals fed 5,000 ppm (0.5 percent) glyphosate. The original pathology report indicated no renal tubule adenomas among 49 animals fed 1,000 ppm (0.1 percent) glyphosate or among the control animals. The registrant has recently submitted information indicating that one animal in the concurrent control group was found to have a renal tubule adenoma. EPA has obtained the relevant slides and is reviewing this finding. The presence of one additional tumor in the control group, however, will not substantially change the conclusions set forth below.

These tumor results are not statistically significant when each treated group is compared to the concurrent control. However, the tumor has rarely been found among untreated (control) mice and there is a statistically significant increase in the glyphosate treated male mice when compared to appropriate historical control findings. There is also a statistically significant dose-related trend. Therefore, EPA considers the study to be positive for oncogenicity at this time.

It should be noted that no statistically or biologically significant increases in tumors were found among female mice from the same study. In addition, a long-term oncogenic study conducted with rats was negative for oncogenicity. Several appropriately conducted and scientifically acceptable mutagenicity tests were also negative.

Thus, in well-conducted oncogenicity studies on both sexes of two species, the incidence of only one tumor type in one sex of one species was found to have an increase related to treatment with glyphosate. This increase in tumors occurred only at very high exposure levels (much higher than usual in long-term studies of pesticides). Furthermore, the positive finding depends upon the presence of tumors in only four treated animals.

The factors listed in the paragraph above indicate that the evidence for oncogenicity, though present, is extremely limited. According to EPA's proposed carcinogen risk assessment guidelines (49 FR 46294), glyphosate would be classified in Category C which is used for agents with limited evidence of carcinogenicity in animals in the absence of human data. Category C is the lowest weight-of-evidence category among the categories with any positive evidence.

Because the renal tubule adenomas are small and could be missed by the usual pathology procedures, EPA has required additional sectioning of new blocks of male mouse kidneys from this study. Results from the additional sectioning are expected to provide a numerically better basis for an oncogenicity conclusion. It is possible, therefore, that EPA's conclusion will change after these data are received and reviewed. On the basis of the information currently available, however, there is weak evidence that glyphosate may be a human oncogen. EPA expects to receive the additional information within two months. Depending upon the results of our review, we may seek advice from the FIFRA Scientific Advisory Panel.

In addition to the limited amount of qualitative evidence supporting a conclusion of oncogenicity, a quantitative risk estimate indicates that, to the extent that glyphosate is actually an oncogen, it is likely to have only a weak oncogenic effect. This is primarily related to the extremely high doses at which effects were observed in the study as compared to likely human exposure. Therefore, based on the information currently available, EPA does not expect any significant risk from the level of glyphosate to which humans are likely to be exposed.

ENVIRONMENTAL IMPACTS

71-5 The relationship between this EIS and individual Resource Management Plans (RMP) is unclear. The Final EIS should identify what type of noxious weed control program will be provided in the RMPs. For example, location of sensitive areas and associated management requirements, and the monitoring program, for the specific resource areas should be included in the RMPs.

Water Quality

Several features should be added to the monitoring program described in Appendix I:

71-6 1. The monitoring and contingency programs need to be defined in more detail for application at the district level in order to achieve consistency.

2. The monitoring program should also measure the effects of herbicide treatment on terrestrial and aquatic ecosystems.

71-7 3. The application rates that would have adverse impacts to the environment should also be included.

71-8 4. The Final EIS should include a requirement that BLM consult with all affected agencies and organizations in designing the monitoring program.

We have several ground-water concerns that need to be addressed:

71-9 1. The ground-water impacts may be understated (page 33). Instances of ground-water contamination by picloram have been reported in Montana and Wyoming. The Final EIS should document statements concerning ground-water contamination.

71-10 2. The potential impact on groundwater, especially in areas which serve as recharge zones for drinking water aquifers, should be addressed under "Water Quality" for Alternative 1.

71-11 3. We recommend that item 4 (page 101) of the Application Contract Requirements be expanded to include ". . . or contaminate groundwater".

We also have some concerns on surface water quality impacts:

71-12 1. It is noted on page 103 that herbicides accumulate in quiet areas, such as lakes and marshes, and can kill or injure vegetation. The EIS should rely on state requirements for determining buffer zones along live streams, lakes or ponds as stated on page 101.

2. The adequacy of these buffer zones in preventing adverse impacts of the preferred alternative should also be evaluated.

3. Buffer zone standards need to be established by the EIS for all wetlands (as defined by the Cowardin system).

71-13 In the last paragraph under surface water on page 21, the DEIS states that the amount of picloram found in a Wyoming study was less than the EPA drinking water standard. The EPA Interim Drinking Water Regulations do not have a standard (maximum contaminant level) for picloram.

Air Quality

71-14 There are several portions of the Northwest region that are nonattainment areas for total suspended particulates under the Clean Air Act (pages 20 and 34). These areas may have standards that are effectively less than $150\ ug/m^3$. These areas should be identified in the Final EIS and a determination made whether the nonattainment areas will be affected.

71-15 Aerial or ground applications of the herbicides should use nozzles that produce a volume mean diameter of 350 to 400 micron droplets. This will improve spraying effectiveness and reduce drift (page 34). The nozzles should have as narrow a droplet spectrum as possible. The DEIS may be inaccurate relating that only 1 percent of the spray concentration would drift over 100 feet (unless the helicopter spray boom is fitted with jet nozzles directed backward or with a Microfoil boom). Dr. Robert Ekblad of the US Forest Service at Missoula, MT has a spray drift model (AGDISP) that could verify this.

71-16 One factor to help protect the public from the health effects of burning is that "those on or near a burning area would be well aware of impending activities because several hours of active preparation are required before ignition begins" (pages 47-48). We recommend that if burning or pesticide application is to take place anywhere near human habitation, that notification take place.

Vegetation

71-17 From Table 3-3, page 46 it is difficult to compare Alternative 4 (no action) to Alternatives 1, 2, and 3. It would be helpful in the Final EIS to include an estimate of actual grazing that would occur under Alternative 4. This would allow the vegetation impacts of each alternative to be more easily compared.

The following issues need additional documentation or detail in the Final EIS:

71-18 1. Pages 2 and 51 of the DEIS refer to the hazards to human health of poisonous plants. The potential of livestock deaths is cited on page 46. The Final EIS should include reported cases of human and livestock poisonings to support these statements. 71-19 The symptoms of leafy spurge on animals may be overstated (page 41). In Montana, some sheep are being raised as a cash crop on a diet consisting largely of leafy spurge. Barbara Mullin of the Montana Department of Agriculture (406/444-5424) can be contacted regarding such grazing use of leafy spurge.

71-20 2. The DEIS states on page 44, "Failure to control or limit spread of such noxious weeds as knapweed and leafy spurge, would reduce by 60 percent the long-term productivity of palatable native plants." The 60 percent figure should be documented in the Final EIS.

71-21 3. Management of the range land plant community, particularly the grazing component, is a very important consideration in a noxious weed control program. Such management commitments were largely overlooked in the EIS. Requirements for proper grazing management to enhance range land ecological condition and thereby help reduce the degree of noxious weed infestations need to be described. Furthermore, the DEIS on page 40 states that the range land ecological conditions will improve under Alternative 1. Such a statement is not necessarily true without adequate grazing control. The Final EIS should describe post-treatment grazing management.

71-22 4. According to the DEIS, BLM will conduct a search for and will protect endangered species (page 40). The "measures" to be used need to be specified, especially as they relate to endangered plants. Table 2-1 (page 29) lists threatened and endangered animals, but there is not a list of threatened and endangered plants. 71-23 The Final EIS needs to recognize and adequately plan for the plant species that have been proposed for listing by the U.S. Fish and Wildlife Service. The Final EIS should also plan for state-listed species of concern of plants and animals.

71-24 5. Plants to be controlled as well as those inadvertently killed during herbicide application provide food and/or cover for wildlife. The loss of this cover and its impact on wildlife should be addressed in more detail in the Final EIS (page 46).

71-25 6. The DEIS addresses to some extent impacts on certain wildlife and plant species. However, it should also address the impacts on other game and non-game wildlife species (aquatic and terrestrial), and non-target plant species.

71-26 7. Though they are identified as low-volatile (page 35), most 2,4-D formulations are still sufficiently volatile to allow evaporation of a significant portion of applied material from leaf and soil surfaces. Even the salt formulations can volatilize to some extent and cause vegetative damage to sensitive plants at some distance from the site of application. This should be clarified in the Final EIS.

71-27 8. The DEIS reports that the level of picloram in surface runoff water was 320 parts per billion (ppb) in one study, and apparently no problems were evident (page 36). Picloram at a level of 100 ppb in irrigation water has been shown to reduce yields in some crops (reference: "Pesticides in Soil and Water", 1974, Soil Science Society of America). The effects of pesticide contamination on crop yields should be evaluated in the Final EIS.

71-28 9. We suggest additional discussion of re-treatment requirements. The DEIS states on page 7 that "Treatment would occasionally have to be repeated in some situations . . . " For example, with currently available chemicals, well established leafy spurge can only be controlled, and not eradicated. Treatment must be repeated every one to three years. The Final EIS should describe the situations where multiple treatment would be needed and identify any impacts.

10. The positive benefits to wildlife, such as increased forage and higher quality habitat, should be mentioned for Alternative 1 (Table 1-4 on pages 12 and 13).

71-29 11. The drawing on page 10 does not coincide with the application height of 1.5 to 2 feet for vehicle mounted sprayers sited on page 9.

HEALTH EFFECTS AND WORST-CASE ANALYSIS

71-30 The DEIS summary states that "Herbicides proposed for use . . . present no significant risk of toxicity to workers" provided that appropriate restrictions are followed. This may be too broad of a generalization. This is true for acute toxicity; however, chronic toxicity may be another matter, as discussed later in the document in relation to cancer. Both carcinogenic effects and other chronic effects of herbicides in humans are not well understood.

71-31 The statement on page 48 that "All chemical effects on biological systems follow a dose-response relationship . . ." could be misleading in that in a typical dose-response, there is a dose of chemical that does not produce an effect. This may not be true for some, or all, forms of cancer, i.e., there may be no low dose of a carcinogen that does not cause cancer. The DEIS then implies that no observed effect level dosages (NOELs) for possible carcinogenic effects have been established. This is misleading as NOELs for carcinogenic effects have not been set. The Final EIS should clarify these points.

Page 48 states that hand pulling would be hazardous to workers. We assume that hand pullers would wear gloves and would not be allergic to weeds. This type of narrative in the EIS can be interpreted as a bias against Alternatives 2 and 3. The Final EIS should present each of the alternatives in as balanced a manner as possible.

The discussion on social environment and the weed control controversy is concise, clear, and very well done (pages 31 and 32).

71-32 The Final EIS should strengthen the scenario portions of the worst-case analysis. The Final EIS should include a risk analysis of an accidental spill before spraying begins. For example, a tank of herbicide from a helicopter or truck could cause considerable environmental damage if it reached surface water or water supplies. In an environmental assessment on helicopter use that EPA prepared we noted that in Federal Aviation Administration data from 1977 to 1979 there were 9 and 5.1 accidents per 100,000 hours of flight time for turbine and piston powered rotorcraft respectively. Aerial spraying may have a higher accident rate. The Final EIS should also include contingency plans for spills, excessive application or accidental misapplication.

71-33 The worst-case analysis is oriented to impacts to human health and cancer. The Final EIS should examine scenarios that may have adverse effects to fish and wildlife.

The discussion about carcinogenicity bioassay uncertainties and Dr. Reuber's conclusions is very helpful to the reviewer (pages 123 and 50), and serves to illustrate the complexities of the chronic effects issue and the differences in opinions among scientific reviewers.

71-34 The DEIS states that under Alternative 2 the greatest herbicide exposure would be to applicators (Summary, page 126). However, public exposure to aerial application should be covered in more depth. The only mention of public exposure is on page 126, where the DEIS states that it would be "highly unusual" for large spraying projects to be located close to residences. The Final EIS should define what is "highly unusual" and what measures will be taken to prevent such an occurrence.

71-35 The first paragraph under "Summary Descriptions of Project Application Scenarios" on page 126 states that "exposure risk is greater with liquid spray applications" than granular. Although clearly stated as an assumption, references should be provided in the Final EIS. It is not unreasonable to assume that mixer loaders may receive greater exposure from dust formulations as compared to liquid formulations.

71-36 The exposure estimates presented in Table N-4, page 129 and the accompanying text coincide with the exposure estimates generated by EPA. Table N-5 and page 130, paragraph 6 appear to confuse dosage with exposure. All references to dosage should be changed to exposure since these figures are normalized exposure estimates based on an application rate of 1 lb active ingredient/acre adjusted for the actual application rates. Dermal absorption rates were not factored into these estimates. This should be corrected in the Final EIS.

The hazard assessment sections for dicamba, picloram, and glyphosate in Appendix K discuss applicator exposure in relationship to that of 2,4-D. The 2,4-D dosage of 0.1 mg/kg is based on Lavy's studies using urinary excretion and so does not "directly" apply to dicamba, picloram, and glyphosate dosage. Since the document addresses the issue of the differences in dermal adsorption, we recommend that the reference to 2,4-D exposure being directly related to dicamba exposure be deleted.

SUMMARY OF RATING DEFINITIONS
AND FOLLOW-UP ACTION*

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment.

Figure 4-1

RESPONSE TO COMMENT LETTER 71

71-1 The herbicide glyphosate has not been proposed for aerial application. See tables 1-3 and N-2 of the DEIS.

71-2 Both picloram and glyphosate are registered for the uses proposed in the noxious weed control program. Copies of the labels have been added to the FEIS as Appendix O. (Note, glyphosate is not proposed for broadcast application to rangeland, but for selective application along waterways.)

71-3 These labels apply to all five states.

71-4 The herbicide glyphosate has been included in the worst-case analysis. See revised Appendix N.

71-5 A resource management plan (RMP) is an overall land use plan for a specific area of BLM managed land. The RMP provides overall guidance to the land manager for dealing with issues identified with public review for that area. The RMP normally provides a means for recognizing such resource management needs such as noxious weed control but does not prescribe the means of control. This EIS is an environmental document analyzing specific means of control.

71-6 Specific monitoring needs such as you suggest be included for terrestrial and aquatic ecosystems are recognized when needed by the site-specific analysis and documentation completed before specific treatments. Consistency is achieved through normal professional specialist techniques for conducting sampling such as outlined in the National Handbook of Recommended Methods for Water-Data Acquisition, US Geological Survey. Monitoring programs must be developed for individual sites and not just applied based on generalized guidance.

71-7 It is beyond the scope of this EIS and the responsibilities of BLM to determine what application rates would be the threshold level where adverse impacts would occur to the environment. BLM is restricted to maximum rates as defined by label restrictions for each herbicide and as approved by the individual states. BLM is proposing application rates much below the recommended maximum rates as defined on the herbicide labels.

71-8 See the Interrelationships section of Chapter 1. BLM works closely with and coordinates its programs with all affected state and federal agencies. In many instances, treatments are applied by state or county weed control organizations with BLM overview.

71-9 BLM's herbicide application program should not affect ground water. With site-specific analysis and documentation, any problem areas would be identified and appropriate measures taken to eliminate the potential for affecting ground water. The two examples you cite where picloram contaminated the ground water in Wyoming and Montana have no relationship to the BLM program. The situation in Wyoming occurred from Tordon pellets being applied on frozen ground on a steep slope directly above an irrigation canal. The pellets were flushed into the canal which then flowed across a sandstone formation where half of the flow was lost to the ground water aquifer. The pellets at that time used borate as the carrier, whereas such pellets are now made with ammonium sulfate which is more soluble. A personal conversation with Bill Often, Missoula County Weed Control Supervisor, revealed that the Montana situation was an isolated incident. The county had a special area for washing and rinsing their herbicide applicator trucks. The resultant waste water entered the ground water which serves as a source of drinking water. The practice has been terminated. Also see responses to comment letters 62-1, 40-14, and 59-20.

71-10 Impacts on ground water from BLM's herbicide treatment proposals are not expected. Site-specific analysis and documentation will identify the recharge zones for drinking water aquifers. These areas will be protected through treatment modifications or stipulations banning treatments.

71-11 The text has been revised to include the suggestion.

71-12 See response to common issue 3. The adequacy of buffer zones cannot be addressed in a document of this scope. As noted in the responses to common issue 3 and to comment 44-19, where state standards or guidelines exist they are used as a minimum requirement. Analysis, however, may lead BLM to impose more stringent requirements.

71-13 The reference was mistakenly made to the drinking water standards when it should have been made to the 24-hour recommended maximum as stated in the EPA report by Newton and Norgren (1977). The text has been corrected.

71-14 BLM recognizes that several nonattainment areas for particulates (TSP) exist in the EIS area. The violation of TSP standards in such areas is usually correlated with periods of atmospheric stability, when particulates are trapped by inversion layers. Any weed burning under the proposed program (910 acres over five states) would occur during periods of relative atmospheric instability. All burning would be conducted in accordance with state smoke management plans (see Relationships of Alternatives to State Resource Protection Goals and Concerns in Interrelationships section of Chapter 1.) and air quality restrictions will be addressed before every burn (see Weed Management Treatment and Design Features in Chapter 1). Some revisions have been made in the air quality impacts section. Also see response to comment 43-41.

71-15 BLM's information on dynamics of spray drift was derived from Yates and others (1978) and from unpublished work by Witt and Montgomery, June 1971. In a 5 mile-per-hour wind, the downwind off-target deposition at 100 feet (about the edge of the usual buffer strip) is expected to be 1 percent of the on-target rate, or about 0.1 mg/ft^2/pound/applied acre. At 500 feet, the deposition is about 0.05 percent or 0.005 mg/ft^2/pound/acre, and at a quarter mile the figure is about 0.001mg/ft^2/pound/acre.

71-16 As stated on page 17 of the DEIS, all residents and landowners within a half mile will be informed before herbicides are applied.

71-17 The purpose of this table is not to address grazing; it is to compare losses of livestock forage under the alternatives.

71-18 See cited references as stated on page 51 (of the DEIS) on reports of human and livestock poisoning.

71-19 See common issue 8.

71-20 The 60 percent figure is supported by Bucher (1984) which estimates forage production is reduced 63 percent due to spotted knapweed. According to Baker (unpublished) leafy spurge reduced forage production by an estimated 75 percent for cattle and horses. A citation has been added.

71-21 See responses 6-1, 6-2, and 43-47 3rd paragraph.

71-22 Before any vegetation treatment or ground disturbance, BLM policy requires a survey of the project site for plants and animals listed or proposed for listing as threatened, endangered and sensitive species (see Glossary). See the fourth paragraph under Weed Management Treatments and Design Features in Chapter 1.

71-23 BLM state, district, or resource area offices will consult with the U.S. Fish and Wildlife Service and the individual state fish and wildlife departments during site-specific analyses and appropriate documentation on proposed threatened and endangered and state-listed plants and animals of concern.

71-24 See response to comment 29-2.

71-25 See responses to the following comments: 20-2, 21-3, 29-2, 31-13, and common issue 6.

71-26 See response to comment 43-40.

71-27 The referenced study was cited to show that picloram is a mobile herbicide. Comparison between that study and the proposed BLM herbicide application program is relevant. The referenced study area covered 279 acres while typically, BLM's treatments would involve 100 or fewer acres. The study applied picloram at the rate of 2.5 pounds per acre. BLM treatments will use a rate of 1 pound or less per acre. Precautions the study used in protecting water sources are not known. Environmental protection is a major aspect of the BLM program as stated in this EIS. Irrigation water is not expected to be affected because most BLM treatments would be in rangeland areas with little potential for affecting water. The concentration reported in the study was obtained immediately below the study plot, and the picloram did not have an opportunity to be diluted. In the 1 July 1983, revised CFR 40, part 180.292, EPA published tolerances of commodity plants for picloram. All plants show a tolerance in the parts per million with forage grasses being the highest at 80 ppm. Conversely, the lowest tolerance level is 0.5 ppm for grain crops. The previously cited study produced a one-time peak below these tolerances.

71-28 See response to comment 15-1. Also the text has been revised.

71-29 Application heights have been revised in the Chemical Methods Design Features section of Chapter 1. The illustration has also been revised.

71-30 The summary is BLM's evaluation of the risk including consideration of the worst-case analysis. EPA must have come to the same conclusion when the chemical was registered for this use. (See FIFRA, Section 3 (C)(5)(D)).

71-31 The text has been revised. Also see response to comment 44-33 dealing with mutations and carcinogenicity.

71-32 BLM has incorporated accident scenarios in the worst-case analysis: see revised Appendix N.

71-33 A discussion of potential impacts on the health of wildlife has been included in Appendix K, Chemical Hazard Assessment.

71-34 Public exposure is discussed throughout Appendix N. Tables N-6, N-12, N-14 and N-15 as does accompanying text (beginning on page 130) and references all deal with public exposure.

71-35 As stated on page 130 of the DEIS and supported by the reference to Lavy and others 1982 and 1980, inhalation doses to workers are negligible compared to dermally absorbed doses.

71-36 Dermal absorption rates were factored into the estimates. See text discussion on page 131 of the DEIS.

72

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

August 16, 1985

Oregon State Director
Bureau of Land Management (935)
c/o R. Gregg Simmons
P.O. Box 2965
Portland, OR 97208

Dear Mr. Simmons:

Thank you for the opportunity to comment on the Environmental Impact Statement (EIS) for the Northwest Area Noxious Weed Control Program. Our comments and recommendations are limited to the state of Washington.

First, we agree that the most effective and efficient control of noxious weeds would be provided by Alternative 1. However, unknowns and potential adverse impacts also appear to be significantly higher. For example, the EIS states on page 32:

> "... questions concerning the effects of using a particular chemical, though they appear to be scientific questions, may have to be answered today in social and political terms. Conclusive scientific analyses may not be completed for years."

Given the continuing evidence regarding substances previously thought safe, this statement takes on added significance. This is further supported by the discussions on pages 47 through 51 on possible effects of various herbicidal chemicals.

This broad consideration, combined with the following more specific comments, forms the basis for our recommendation stated later in this letter.

Comments:

72-1 1. There is no discussion of the handling and disposal of the residue from chemical containers. Washington State, and presumably other Northwest states, are faced with a problem in controlling residue and containers. Adequate means of assuring that residue is properly handled and containers disposed of remains a serious concern.

72-2 2. Appendix H-1 indicates that a total of 1839 acres of annual weed treatment would occur under Alternative 1. Under Alternative 3, a total of 2400 acres would receive treatment.

August 16, 1985
Page 2

72-3 3. There is little discussion of specific risks to human health (pages 47 to 50) from chemical application. Accidental spills, loading accidents, equipment failure, etc. are not mentioned. This is in contrast to very specific risks described under mechanical and manual treatment techniques.

4. The discussion on Impacts on Human Health for Alternative 4, while undoubtedly accurate, appears to be somewhat overstated. Many common plants, including garden vegetables and ornamental plants (both domesticated and wild), are also well documented as effecting human health if ingested.

5. A continuing concern is the possibility of both surface and ground water contamination by chemical treatment. The amount proposed for treatment in the EIS, in and of itself, probably will not be significant, but the cumulative effects of this and other public and private sources of contamination greatly enhance potential risks.

Recommendation:

The Washington Department of Ecology recommends Alternative 3 (no herbicide use) as the preferred alternative for noxious weed control on BLM lands within the state of Washington.

Thank you again for the opportunity to comment.

Sincerely,

Marvin Vialle
Environmental Planner

cc: John Arnquist, WDOE Eastern Region
Russ Taylor, WDOE Central Region
Earl Tower, WDOE Dangerous Waste
Bob Monn, WDOE Water Quality
Greg Sorlie, WDOE Environmental Review

RESPONSE TO COMMENT LETTER 72

72-1 **Empty herbicide containers will be disposed of in accordance with the herbicide labels and state requirements.**

72-2 **There was a typographical error in the number of acres estimated for manual treatments using hand tools under Alternative 3. Corrections have been made.**

72-3 **A worst-case analysis of the potential risk to human health was presented in Appendix M. Appendix M has been revised to include an analysis on accidental spills.**

List of Agencies, Organizations and Persons to Whom Copies of the Statement are Sent

Comments on the draft EIS were requested from the following:

Federal Agencies

Advisory Council on Historic Preservation
Department of Agriculture
  Forest Service
  Soil Conservation Service
Department of Commerce
  National Marine Fisheries Service
Department of Defense
  U.S. Army Corps of Engineers
Department of Energy
  Bonneville Power Administration
Department of the Interior
  Fish and Wildlife Service
  Bureau of Indian Affairs
  Geological Survey
  Bureau of Mines
  Bureau of Reclamation
  National Park Service
Environmental Protection Agency
Small Business Administration

State and Local Government

Idaho

Department of Agriculture
  County Weed Control Superintendents
  State Seed Laboratory
Department of Fish and Game
Department of Lands
Department of Transportation

Montana

Department of Agriculture
  County Weed Control Supervisors
Department of Fish, Wildlife and Parks
Department of State Land
Department of Commerce
Department of Natural Resources and Conservation
Department of Health and Environmental Sciences
Department of Livestock
Environmental Quality Council
Montana Highway Commission

Oregon

State Clearinghouse
Areawide Clearinghouses
Lane Regional Pollution Authority
Department of Environmental Quality
Department of Fish & Wildlife
Department of Forestry
State Historic Preservation Office
Department of Agriculture
Weed Control Districts

Washington

Office of the Governor
Office of the Secretary of State
Washington State Library
State Conservation Commission
Department of Natural Resources
Parks and Recreation Commission
Department of Ecology
Department of Agriculture
  Weed Control Boards
Department of Game
Department of Fisheries
Farm Bureau
Division of Geology and Earth Resources
Department of Transportation
Commissioner of Public Lands

Wyoming

Governor's Office
Department of Agriculture
  County Weed Control Officials
Department of Forestry
State Game and Fish
State Highway Department
Department of Environmental Quality

Interest Groups (partial listing)

Audubon Society
FIR
Friends of the Earth
Izaak Walton League
Menasha Corp.
National Wildlife Federation
Northwest Coalition for Alternatives
 to Pesticides
Economic Development Commissions
Environmental Councils
Wheat Growers Leagues
Wilderness Coalitions
Wildlife Federations
Oregonians for Food and Shelter
Sierra Club
Stockmen's Associations
Southern Oregon Citizens Against
 Toxic Sprays
State Universities
Western Environmental Trade
 Association
Indian Tribes
Friends of the Earth
League of Women Voters
Natural Resources Defense Council
Nature Conservancy
Society for Range Management
Society of American Foresters
Wildlife Management Institute
Wilderness Society
Cattlemen's Association

LIST OF PREPARERS

Though individuals have primary responsibility for preparing sections of an EIS, the document is an interdisciplinary team effort. In addition, internal review of the document occurs throughout preparation. Specialists at the BLM's district, state and Washington Office levels both review the analysis and supply information. Contributions by individual preparers may be subject to revision by other BLM specialists and by management during internal review.

Name	Primary Responsibility	Related Professional Experience
Team Members		
Helen Birss	Economics, Social Environment	3 yrs (Range Tech) 2 yrs (Economist)
Steve Ellis	Description of Alternatives, Climatology, Soils, Cultural Resources, Visual Resources and Recreation, Air Quality, Wilderness and Special Areas	6 yrs (Forester and Soil Scientist)
Cliff Franklin	Water Resources, Interrelationships	15 yrs (Forester and Hydrologist)
Herbert K. McGinty	Team Editor	9 yrs (Editor) 3 1/2 years (Geographer)
Hank McNeel	Vegetation, Wildlife, Fish, Threatened and Endangered Species	22 yrs (Agronomist)
R. Gregg Simmons	Team Leader, Worst-Case Analysis	10 yrs (Environmental Coordinator, Forester)
Dr. Richard Straub	Human Health, Chemical fates and Effects, Worst-Case Analysis	13 yrs (Pest Control Research, Cornell Univ.)
Support Group		
Debra Carey-Delgado	Illustrator	13 yrs (Draftsman)
David Collier	Photo Work	18 yrs (Offset Photographer)
Mary Erickson	Word Processing	1 yr (Operator)
Gary Haase	Visual and Graphic Information	4 yrs (Visual Information Specialist)
Gary Hyler	Cartographics	7 yrs (Cartographic Technician)
Alice Johnson	Typing	20 yrs (Secretary)
Lisa Powne	Weed Illustrations	9 yrs (Cartographic Technician)
Shirley Wescott	Word Processing	6 yrs (Operator)
Edward Zigoy	Drafting	7 yrs (Cartographic Technician)

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Appendix A

Federal Noxious Weed Control Laws

Carlson-Foley Act (PL 90-583)

Federal Noxious Weed Act (PL 93-629)

(State laws for noxious weed control may be obtained from respective state departments of agriculture.)

Public Law 90-583

October 17, 1968
[S. 2671]

AN ACT

To provide for the control of noxious plants on land under the control or jurisdiction of the Federal Government.

Noxious plant control.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the heads of Federal departments or agencies are authorized and directed to permit the commissioner of agriculture or other proper agency head of any State in which there is in effect a program for the control of noxious plants to enter upon any lands under their control or jurisdiction and destroy noxious plants growing on such land if—

(1) such entry is in accordance with a program submitted to and approved by such department or agency: *Provided*, That no entry shall occur when the head of such Federal department or agency, or his designee, shall have certified that entry is inconsistent with national security;

(2) the means by which noxious plants are destroyed are acceptable to the head of such department or agency; and

(3) the same procedure required by the State program with respect to privately owned land has been followed.

Sec. 2. Any State incurring expenses pursuant to section 1 of this Act upon presentation of an itemized account of such expenses shall be reimbursed by the head of the department or agency having control or jurisdiction of the land with respect to which such expenses were incurred: *Provided*, That such reimbursement shall be only to the extent that funds appropriated specifically to carry out the purposes of this Act are available therefor during the fiscal year in which the expenses are incurred.

Appropriation authorization.

Sec. 3. There are hereby authorized to be appropriated to departments or agencies of the Federal Government such sums as the Congress may determine to be necessary to carry out the purposes of this Act.

Approved October 17, 1968.

Public Law 93-629

January 3, 1975
[H. R. 11273]

AN ACT

To provide for the control and eradication of noxious weeds, and the regulation of the movement in interstate or foreign commerce of noxious weeds and potential carriers thereof, and for other purposes.

Federal Noxious Weed Act of 1974.
7 USC 2801 note.
7 USC 2801.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Federal Noxious Weed Act of 1974".

SEC. 2. The importation or distribution in interstate commerce of noxious weeds, except under controlled conditions, allows the growth and spread of such weeds which interfere with the growth of useful plants, clog waterways and interfere with navigation, cause disease, or have other adverse effects upon man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health. The uncontrolled distribution within the United States of noxious weeds after their importation or interstate distribution has like detrimental effects and allowing such distribution encourages and facilitates the burdening and obstructing of interstate and foreign commerce, and is inimical to the public interest. Accordingly, the Congress hereby determines that the regulation of transactions in, and movement of, noxious weeds as provided in this Act is necessary to prevent and eliminate burdens upon and obstructions to interstate and foreign commerce and to protect the public welfare.

Definitions.
7 USC 2802.

SEC. 3. As used in this Act, except where the context otherwise requires:

(a) "Secretary" means the Secretary of Agriculture of the United States or any other person to whom authority may be delegated to act in his stead.

(b) "Authorized inspector" means any employee of the Department of Agriculture, or any employee of any other agency of the Federal Government or of any State or other governmental agency which is cooperating with the Department in administration of any provisions of this Act, who is authorized by the Secretary to perform assigned duties under this Act.

(c) "Noxious weed" means any living stage (including but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish or wildlife resources of the United States or the public health.

(d) "United States" means any of the States, territories, or districts of the United States.

(e) "Interstate" means from any State, territory, or district of the United States into or through any other State, territory, or district.

(f) "District" means the District of Columbia, the Commonwealth of Puerto Rico, or any possession of the United States.

(g) "Move" means deposit for transmission in the mails, ship, offer for shipment, offer for entry, import, receive for transportation, carry, or otherwise transport or move, or allow to be moved, by mail or otherwise.

Prohibitions.
7 USC 2803.

SEC. 4. (a) No person shall knowingly move any noxious weed, identified in a regulation promulgated by the Secretary, into or through the United States or interstate, unless such movement is authorized under general or specific permit from the Secretary and is made in accordance with such conditions as the Secretary may prescribe in the permit and in such regulations as he may promulgate under this Act to prevent the dissemination into the United States, or interstate, of such noxious weeds.

(b) The Secretary may refuse to issue a permit for the movement of any such noxious weed when, in his opinion, such movement would involve a danger of dissemination of such noxious weeds into the United States or interstate.

(c) No person shall knowingly sell, purchase, barter, exchange, give, or receive any such noxious weed which has been moved in violation of subsection (a), or knowingly deliver or receive for transportation or transport, in interstate or foreign commerce, any advertisement to sell, puchase, barter, exchange, give, or receive any such noxious weed which is prohibited from movement in such commerce under this Act.

Quarantines and regulations.
7 USC 2804.

SEC. 5. (a) The Secretary may promulgate such quarantines and other regulations requiring inspection of products and articles of any character whatsoever and means of conveyance, specified in the regulations, as a condition of their movement into or through the United States and otherwise restricting or prohibiting such movement, as he deems necessary to prevent the dissemination into the United States of any noxious weeds, and it shall be unlawful for any person to move any products, articles, or means of conveyance into or through the United States contrary to any such regulation.

Temporary quarantine.

(b) Whenever the Secretary has reason to believe that an infestation of noxious weeds exists in any State, territory, or district, he may by regulation temporarily quarantine such jurisdiction, or a portion thereof, and by regulation may restrict or prohibit the interstate movement from the quarantined area of any products and articles of any character whatsoever and means of conveyance, capable of carrying such noxious weeds, and after promulgation of such quarantine and other regulations, it shall be unlawful for any person to move interstate from a quarantined area any such products, articles, or means of conveyance, specified in the regulations, except in accordance with such regulations: *Provided, however*, That such quarantine and regulations shall expire at the close of the ninetieth day after their promulgation.

Expiration.

Hearing.

(c) However, if, after public hearing, the Secretary determines, on the basis of the information received at the hearing and other information available to him, that such a quarantine and regulations are necessary in order to prevent the interstate spread of noxious weeds from any State, territory, or district in which he determines an infestation of noxious weeds exists, and to protect the agriculture, commerce, fish, or wildlife resources of the United States or the public health, he shall promulgate such quarantine and other regulations as he determines are appropriate for such purposes, and thereafter it shall be unlawful for any person to move interstate from any quarantined area any regulated products, articles, or means of conveyance except in accordance with such regulations.

Disposal.
7 USC 2805.

SEC. 6. (a) Except as provided in paragraph (c) of this section, the Secretary may, whenever he deems it necessary as an emergency measure in order to prevent the dissemination of any noxious weed, seize, quarantine, treat, destroy, or otherwise dispose of, in such manner as he deems appropriate, any product or article of any character whatsoever, or means of conveyance, which is moving into or through the United States or interstate, in bond or otherwise, and which he has reason to believe is infested by any noxious weed or contains any such weed, or which has moved into the United States, or interstate, and which he has reason to believe was infested by or contained any noxious weed at the time of such movement: and any noxious weed, product, article, or means of conveyance which is moving into or through the United States, or interstate, or has moved into the United States, or interstate, in violation of this Act or any regulation hereunder.

(b) Except as provided in subsection (c) of this section, the Secretary may order the owner of any product, article, means of conveyance, or noxious weed subject to disposal under subsection (a) of this section, or his agent, to treat, destroy, or make other disposal of such product, article, means of conveyance, or noxious weed, without cost to the Federal Government and in such manner as the Secretary deems appropriate. The Secretary may apply to the United States District Court, or to the United States court of any territory or possession, for the judicial district in which such person resides or transacts business or in which the product, article, means of conveyance, or noxious weed is found, for enforcement of such order by injunction, mandatory or otherwise. Process in any such case may be served in any judicial district wherein the defendant resides or transacts business or may be found, and subpenas for witnesses who are required to attend a court in any judicial district in such a case may run to any other judicial district.

(c) No product, article, means of conveyance, or noxious weed shall be destroyed, exported, or returned to shipping point of origin, or ordered to be destroyed, exported, or so returned under this section, unless in the opinion of the Secretary there is no less drastic action which would be adequate to prevent the dissemination of noxious weeds into the United States or interstate.

Civil action.

(d) The owner of any product, article, means of conveyance, or noxious weed destroyed, or otherwise disposed of, by the Secretary under this section, may bring an action against the United States in the United States District Court for the District of Columbia, within one year after such destruction or disposal, and recover just compensation for such destruction or disposal of such product, article, means of conveyance, or noxious weed (not including compensation for loss due to delays incident to determining its eligibility for movement under this Act) if the owner establishes that such destruction or disposal was not authorized under this Act. Any judgment rendered in favor of such owner shall be paid out of the money in the Treasury appropriated for administration of this Act.

Authorized inspectors.
7 USC 2806.

SEC. 7. Any authorized inspector, when properly identified, shall have authority (a) without a warrant, to stop any person or means of conveyance moving into the United States, and inspect any noxious weeds and any products and articles of any character whatsoever, carried thereby, and inspect such means of conveyance, to determine whether such person or means of conveyance is moving any noxious weed, product, article, or means of conveyance contrary to this Act or any regulation under this Act; (b) without a warrant, to stop any person or means of conveyance moving through the United States or interstate, and inspect any noxious weeds and any products and articles of any character whatsoever carried thereby, and inspect such means of conveyance, to determine whether such person or means of conveyance is moving any noxious weed, product, article, or means of conveyance contrary to this Act or any regulation thereunder, if such inspector has probable cause to believe that such person or means of conveyance is moving any noxious weed regulated under this Act; and (c) to enter, with a warrant, any premises in the United States, for purposes of any inspections or other actions necessary under this Act. Any judge of the United States or of a court of record of any State, territory, or district, or a United States commissioner, may, within his respective jurisdiction, upon proper oath or affirmation showing probable cause to believe that there are on certain premises any products, articles, means of conveyance, or noxious weeds subject to this Act, issue warrants for the entry of such premises for purposes of any inspection or other action necessary under this Act, except as otherwise provided in section 9 of this Act. Such warrants may be executed by any authorized inspector or any United States marshal.

Warrants, issuance.

Penalty.
7 USC 2807.

SEC. 8. Any person who knowingly violates section 4 or 5 of this Act, or any regulation promulgated under this Act, shall be guilty of a misdemeanor and shall be punished by a fine not exceeding $5,000, or by imprisonment not exceeding one year, or both.

Federal agencies, cooperation.
7 USC 2808.

SEC. 9. (a) The Secretary is authorized to cooperate with other Federal agencies, agencies of States, territories, or districts, or political subdivisions thereof, farmers' associations, and similar organizations, and individuals in carrying out operations or measures in the United States to eradicate, suppress, control, or prevent or retard the spread of any noxious weed. The Secretary is authorized to appoint employees of other agencies of the Federal Government or any agencies of any State, territory, or district, or political subdivisions thereof, as collaborators to assist in administration of the provisions of this Act, pursuant to cooperative agreements with such agencies, whenever he determines that such appointments would facilitate administration of this Act.

(b) In performing the operations or measures authorized by subsection (a) of this section, the cooperating State or other governmental agency shall be responsible for the authority necessary to carry out the operations or measures on all lands and properties within the State or other jurisdiction involved, other than those owned or controlled by the United States Government, and for such other facilities and means as in the discretion of the Secretary are necessary.

Regulations.
7 USC 2809.

SEC. 10. The Secretary is authorized to promulgate regulations necessary to effectuate the provisions of this Act. However, any regulation identifying a noxious weed under section 4 of this Act shall be promulgated only after publication of a notice of the proposed regulation and, when requested by any interested person, a public hearing on the proposal. Any such regulation shall be based upon the information received at any such hearing and other information available to the Secretary and a determination by the Secretary that the plant is within the definition of a noxious weed in section 3(c) of this Act and that its dissemination in the United States may reasonably be expected to have, to a serious degree, any effect specified in section 3(c).

Hearing.

Appropriation.
7 USC 2810.

SEC. 11. There are hereby authorized to be appropriated such sums as Congress may from time to time determine to be necessary for the administration of this Act. Any sums so appropriated shall be available for expenditures for the purchase, hire, maintenance, operation, and exchange of aircraft and other means of conveyance, and for such other expenses as may be necessary to carry out the purposes of this Act. However, unless specifically authorized in other legislation or provided for in appropriations, no part of such sums shall be used to pay the cost or value of property injured or destroyed under section 9 of this Act.

Nonapplicability.
7 USC 2811.

SEC. 12. The provisions of this Act shall not apply to shipments of seed subject to the Federal Seed Act (53 Stat. 1275, as amended; 7 U.S.C. 1551 et seq.) and this Act shall not amend or repeal any of the provisions of said Act or of the Plant Quarantine Act of August 20, 1912 (37 Stat. 315, as amended: 7 U.S.C. 151–154, 156–164a, 167), the Federal Plant Pest Act (71 Stat. 31; 7 U.S.C. 150aa–150jj), or any other Federal laws.

7 USC 2812.

SEC. 13. The provisions of this Act shall not invalidate the provisions of the laws of any State or political subdivision thereof, or of any territory or district of the United States relating to noxious weeds, except that no such jurisdiction may permit any action that is prohibited under this Act.

Separability.
7 USC 2813.

SEC. 14. If any provision of this Act or the application thereof to any person or circumstances is held invalid, the remainder of the Act and the application of such provision to other persons and circumstances shall not be affected thereby.

Approved January 3, 1975.

Appendix B

Results of Scoping and Court Briefs

A Federal Register notice was published on February 20, 1985 informing the public of BLM's formation of a team to prepare an environmental impact statement (EIS) on the control of noxious weeds on BLM-administered land in the five states of Idaho, Montana, Oregon, Washington and Wyoming. Shortly thereafter, each BLM state office responsible for administering land in these states distributed news releases to appropriate local newspapers. These news releases requested that all interested parties notify BLM of what they felt were important issues and alternatives. BLM has also included and made extensive use of the concerns and issues raised in the briefs presented to the Ninth Circuit Court in the District Courts of Oregon and California in regard to the application of herbicides and their potential harm to human health.

Alternatives:

The alternatives to be considered were published as part of the scoping process. Although no more alternatives were proposed, several statements received agreed with the selections. (See Chapter 1, Description of Alternatives Including the Proposed Action.)

Issues and Concerns Addressed:

Listed below are the issues and concerns expressed in scoping letters received and in briefs.

Soils

- Weed control may increase erosion.

Water

- Herbicides may contaminate streams.
- Sedimentation may increase.
- Stream buffers should be maintained.
- What are the long-term effects of chemicals on ground water?
- Persistence of herbicides in the environment needs to be evaluated.

Vegetation

- Effects on threatened or endangered species.
- Effects of no control on native range species.
- Herbicide spray may drift to nontarget species.
- Effects of no control on adjacent land vegetation.

Fish and Wildlife

- Loss of habitat due to noxious weeds.
- Herbicide effects on fish populations.

Human Health

- Should herbicides be used at all?
- What are short-term effects of herbicides on human health.
- Need to discuss levels of toxicity of proposed herbicides.
- Need to discuss long-term effects on human health.
- Worst-case analysis of cancer effects to exposed populations
- Long-term effects of toxic weeds on human health.

Economic Conditions

- Impact of noxious weeds on property values and on livestock and agricultural production.
- No-control impacts on efforts of other control agencies.
- Effects on local economies from control actions.

Recreation

- Impacts on visual resources from control actions.
- Impacts of no control on recreation activities.
- Control of noxious weeds in wilderness areas or wilderness study areas.

Issues not addressed because they were beyond the scope of this EIS.

- Road building serves as a major cause of noxious weed introduction.

BLM agrees that road building is one way that noxious weeds are introduced, but addressing impacts associated with road building is outside the scope of this EIS.

Appendix C

Noxious Weeds and Poisonous Plants of the EIS Area

C-1. Noxious Weed Target Species to be Treated

C-2. Noxious and Troublesome Weeds to be Considered for Treatment

C-3. Poisonous Plants to be Considered for Treatments in the EIS Area

Appendix C-1. Noxious Weed Target Species to be Treated

Common Name	Scientific Name	Origin	Life Duration	Average Annual % of Spread[1]	Average Annual % Reduction of Carrying Capacity [1]	Reported Toxic Effects to Other Plants
Canada thistle	*Cirsium arvense*	Eurasia	creeping perennial	10	42	no
hoary cress (whitetop)	*Cardaria draba*	Europe	creeping perennial	9	55	no
leafy spurge	*Euphorbia esula*	Eurasia	creeping perennial	12	59[2]	yes
Russian knapweed	*Centaurea repens*	Eurasia	creeping perennial	8	55	yes
spotted knapweed	*Centaurea maculosa*	Eurasia	biennial or simple perennial	24	80	yes
diffuse knapweed	*Centaurea diffusa*	Eurasia	annual, biennial, or simple perennial	18	59	yes
dalmatian toadflax	*Linaria dalmatica*	Europe	creeping perennial	8	46	no
common toadflax (yellow toadflax) (butter-and-eggs)	*Linaria vulgaris*	Eurasia	creeping perennial	9	34	no
common tansy (garden tansy)	*Tanacetum vulgare*	Europe	creeping perennial	11	50	no
tansy ragwort (common (ragwort, stinking Willie, staggerwort)	*Senecio jacobaea*	Europe	biennial or simple perennial	16	45	no
Dyers woad	*Isatis tinctoria*	Europe	annual, biennial, or simple perennial	14	38	no
yellow starthistle	*Centaurea solstitialis*	Europe	annual or biennial	17	65[3]	yes
musk thistle	*Carduus nutans*	Eurasia	biennial	15	38	no
Scotch thistle	*Onopordum acanthium*	Eurasia	biennial	16	38	no

[1] Averages obtained from personal communications with the following weed scientists:
Dr. Harold Alley, Emeritus, University of Wyoming, Laramie, Wyoming
Dr. Gene Arnold, South Dakota State University, Brookings, South Dakota
Dr. Bob Callihan, University of Idaho, Moscow, Idaho
Dr. Pete Faye, Montana State University, Bozeman, Montana
Dr. Calvin Messersmith, North Dakota State University, Fargo, North Dakota
Dr. Tom Whitsom, Oregon State University, Corvallis, Oregon

[2] Utilization by cattle and horses is zero.

[3] Utilization by all animals after bud formation is zero.

Appendix C-2. Noxious and Troublesome Weeds to be Considered for Treatment

Common Name	Scientific Name	Origin	Life Duration
Austrian fieldcress	*Rorippa austriaca*	Europe	creeping perennial
Austrian peaweed (Swainson pea)	*Swainsona salsula*	Asia	perennial
buffalo bur	*Solanum rostratum*	Native	annual
camelthorn	*Alhagi camelorum*	Mediterranean	perennial
common crupina (bearded creeper)	*Crupina vulgaris*	Europe	annual
field bindweed (wild morning glory, creeping jenny)	*Convolvulus arvensis*	Europe	creeping perennial
black henbane	*Hyoscyamus niger*	Europe	annual, biennial
jointed goatgrass	*Aegilops cylindrica*	Mediterranean	annual
purple loosestrife	*Lythrum salicaria*	Mediterranean	perennial
perennial pepperweed	*Lepidium latifolium*	Europe	creeping perennial
perennial sowthistle	*Sonchus arvensis*	Eurasia	creeping perennial
poison hemlock	*Conium maculatum*	Eurasia	biennial
puncture vine (caltrop)	*Tribulus terrestris*	Europe	annual
rush skeletonweed	*Chondrilla juncea*	Eurasia	perennial
silver-leaf nightshade (white horsenettle)	*Solanum elaegnifolium*	Native	perennial
skeletonleaf bursage (povertyweed, bur-ragweed, silver leaf)	*Franseria discolor*	Native	creeping perennial
Syrian bean caper	*Zygophyllum fabago*	Mediterranean	annual
wild carrot (Queen Anne's lace)	*Daucus carota*	Eurasia	biennial
gorse	*Ulex europaeus*	Europe	perennial
Mediterranean sage	*Salvia aethiopis*	Mediterranean	biennial

Appendix C-3. Poisonous Plants to be Considered for Treatment in the EIS Area

Common Name	Scientific Name	Origin	Life Duration
ragweed	*Ambrosia spp.*	Eastern U.S.	annual
western false hellebore	*Veratrum californicum*	Native	perennial
death camas	*Zigadenus paniculatus*	Native	perennial
halogeton	*Halogeton glomeratus*	Asia	annual
locoweed (Tweedy's milkvetch)	*Astragalus tweedyi*	Native	perennial
St. Johnswort (Klamath weed, goatweed)	*Hypericum perforatum*	Europe	creeping perennial
western water hemlock	*Cituta douglasii*	Native	annual
jimson weed (Jamestown weed, thornapple)	*Datura stratamonium*	N. America	annual
common groundsel	*Senecio vulgaris*	Europe	annual
cocklebur	*Xanthium pennsylvanicum*	Native	annual
Indian hemp (hemp dogbane)	*Apocynum cannabinum*	Native	creeping perennial
larkspur	*Delphinium spp.*	Native	perennial
white snakeroot	*Eupatorium rugosum* (*Eupatorium urticaefolium*)	Native	creeping perennial
sneezeweed	*Helenium spp.*	Native	creeping perennial
lupine	*Lupinus spp.*	Native	perennial
crazyweed	*Oxytropis spp.*	Native	perennial

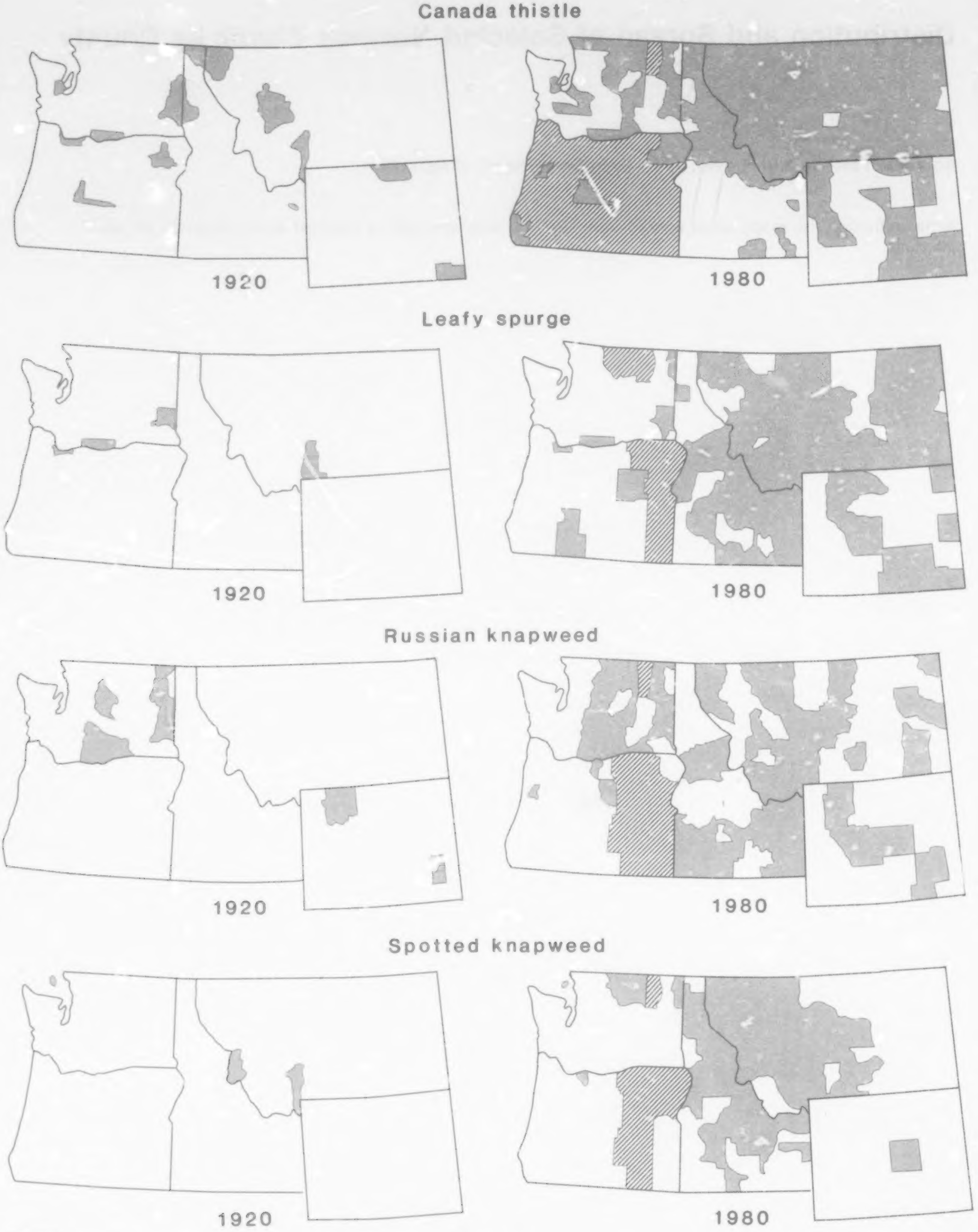
Appendix D

Distribution and Spread of Selected Noxious Weeds by County

Sources: Forcella and Harvey, 1981; State Departments of Agriculture.

Note: Although the maps show spread from 1920 to 1980, the data referenced is displayed by 10-year intervals.

Distribution and Spread of Selected Noxious Weeds 1920-1980


Canada thistle

Leafy spurge

Russian knapweed

Spotted knapweed

1920
1980
1920
1980
1920
1980
1920
1980

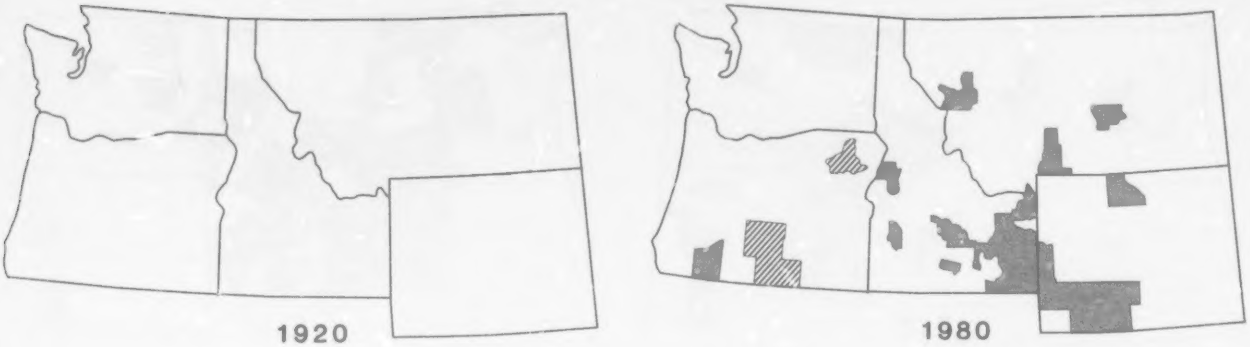
▨ Data from Forcella and Harvey, 1981.

▨ Areas of infestation noted in comment letters.

Figure D-1

Distribution and Spread of Selected Noxious Weeds 1920-1980

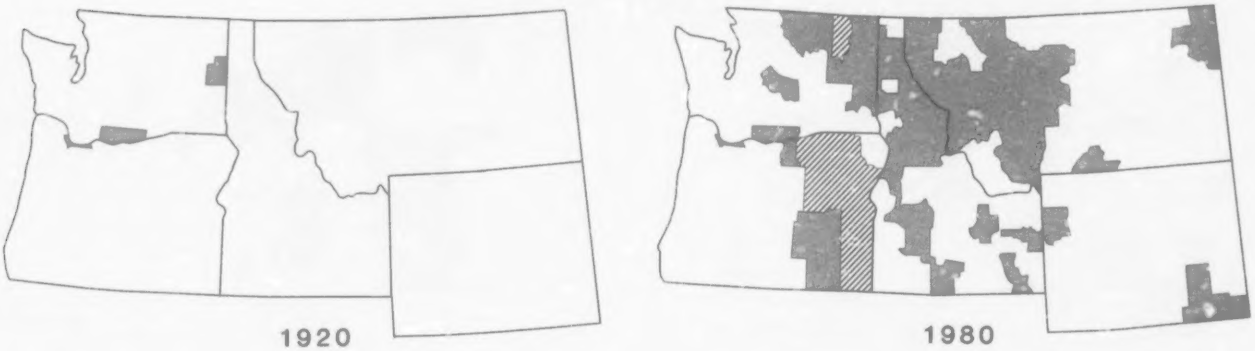
Dyer's woad



1920

1980

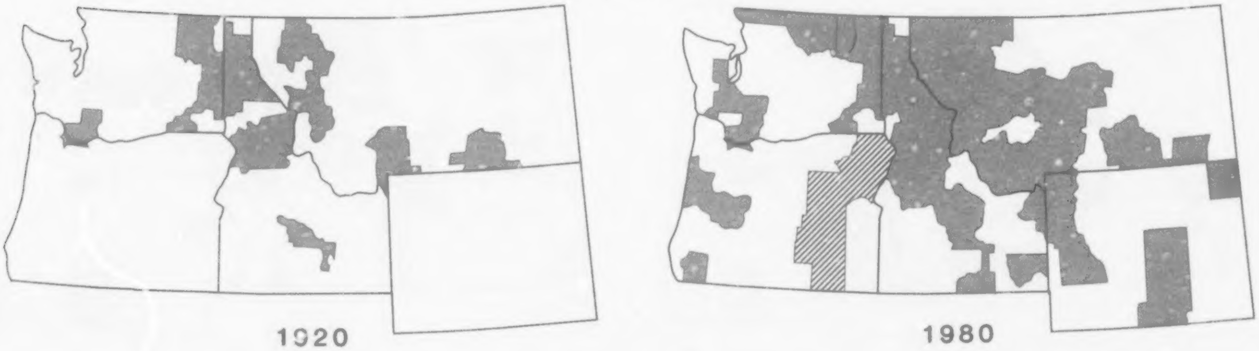
Dalmatian toadflax



1920

1980

Yellow toadflax



1920

1980

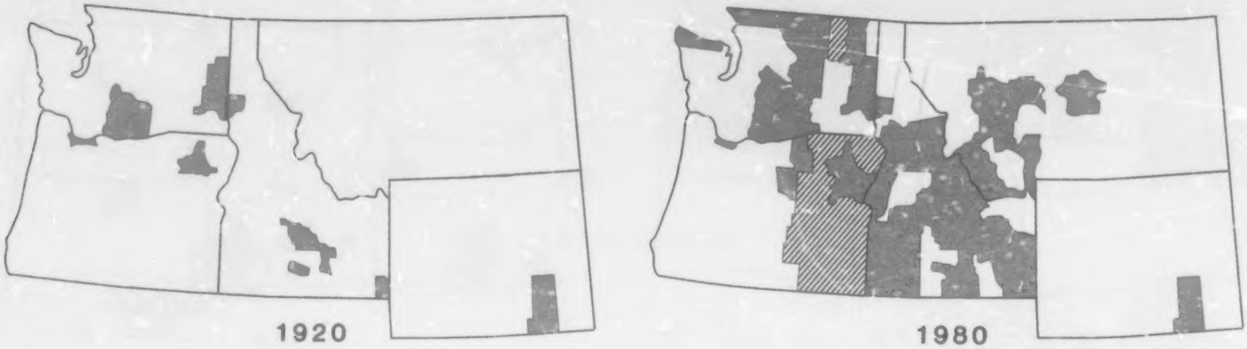
■ Data from Forcella and Harvey, 1981.

▨ Areas of infestation noted in comment letters.

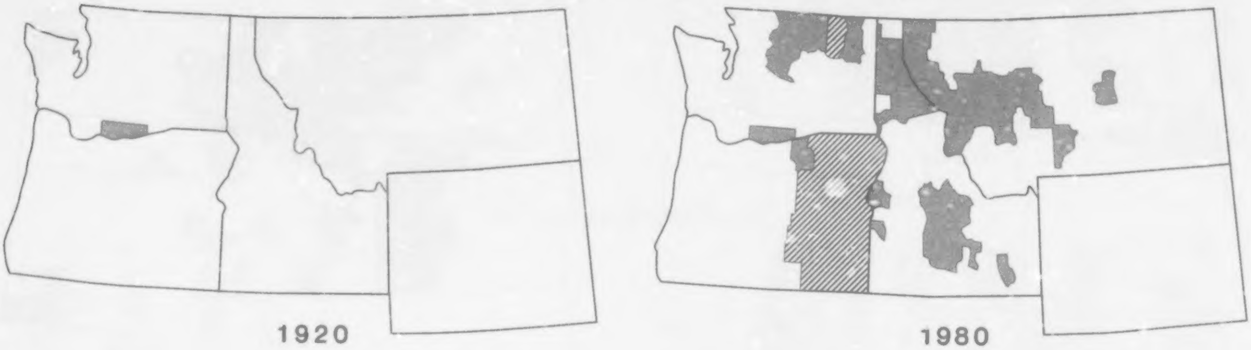
Figure D-2

Distribution and Spread of Selected Noxious Weeds 1920-1980

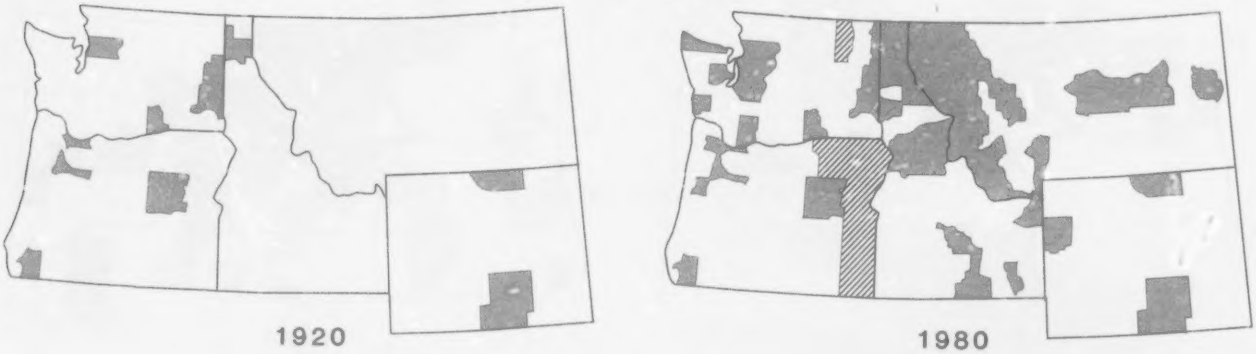
Hoary cress


1920 1980

Diffuse knapweed


1920 1980

Common tansey


1920 1980

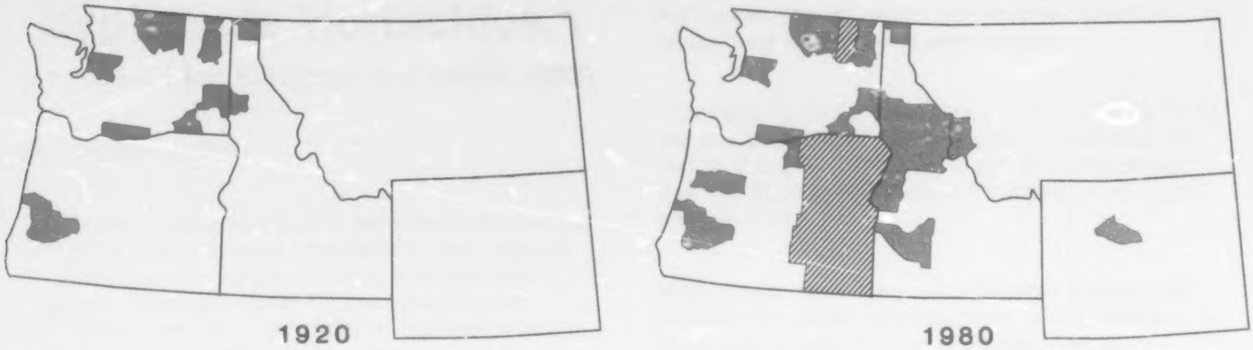
■ Data from Forcella and Harvey, 1981.

▨ Areas of infestation noted in comment letters.

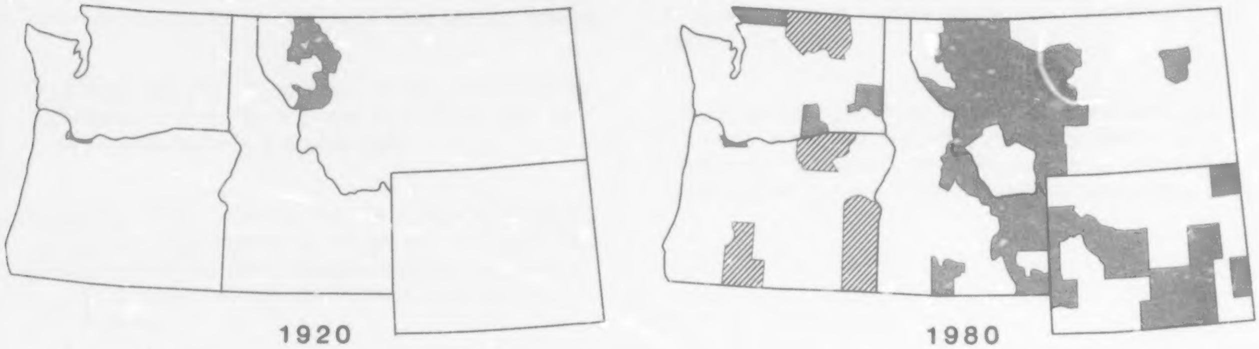
Figure D-3

Distribution and Spread of Selected Noxious Weeds 1920-1980

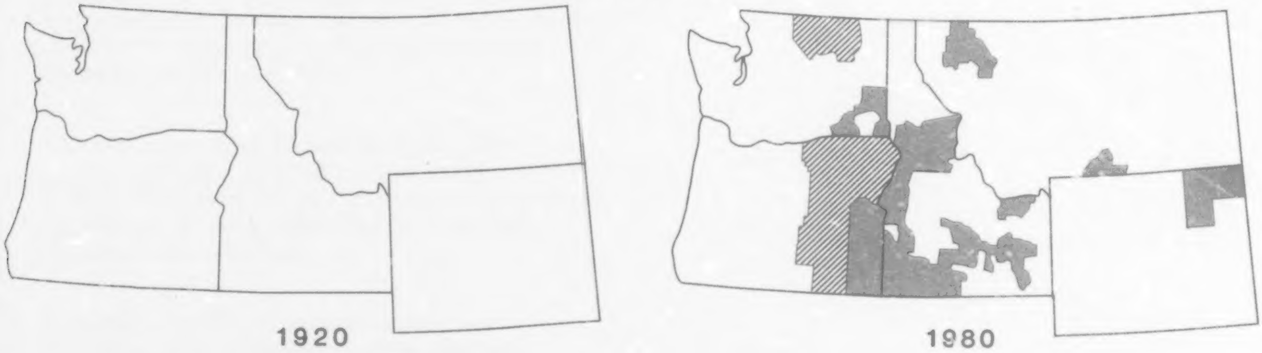
Yellow star-thistle



Musk thistle



Scotch thistle



■ Data from Forcella and Harvey, 1981.

▨ Areas of infestation noted in comment letters.

Figure D-4

Appendix E

Susceptibility of Common Plants to Control by 2,4-D, Dicamba, Picloram, and Glyphosate Herbicides.

(compiled from Klingman and others 1983)

Susceptibility Chart

The table in Appendix E lists the effects of phenoxy and some other systemic herbicides when applied as sprays on the foliage of many common plant species. These comparisons are based on an application rate of 1 pound active equivalent per acre for 2,4-D, dicamba, and picloram and 1.5 pounds active ingredient per acre for glyphosate.

The control ratings for the herbicides are as follows:

Excellent (E). Over 95 percent of the plant species population is killed by a single treatment. Plant is highly susceptible to the chemical.

Good (G). One treatment per year maintains 85 to 94 percent suppression of top growth, or more than 95 percent of the plant species population is killed by two or three treatments. Plant is susceptible to the chemical.

Fair (F). From 60 to 85 percent of the plant species population is killed by a single treatment, or two or three treatments per year maintain 85 to 94 percent suppression of top growth. Plant is moderately susceptible to the chemical.

Poor (P). From 10 to 59 percent of the plant species population is killed by one treatment, or two or three treatments per year maintain 60-84 percent suppression of top growth. Plant is moderately resistant to the chemical.

None (N). Little or no effect is gained from treatments. Plant is resistant to the chemical.

Insufficient Data (I). Insufficient data exist to determine effectiveness.

The types of plants are shown as follows:

A = Annual
PN = Perennial
B = Biennial
W = Woody

The plant species in this table in some situations are considered as weeds and in other situations are considered as a desired plant species.

This table is; to be considered as a reference as to the susceptibility of the herbicides considered for use in this EIS. This table is not to be construed that the BLM is considering treatment of all plant species listed.

Most plants, once they have become established, require more than one treatment, if the desire is to eradicate or establish an economic control level of the plant. Difference in herbicide residual is an important factor in determining the rate of application, period of time of treatment, and number of applications of herbicides required to eradicate or control the plant.

Woody plants have been largely excluded from the following table. For response of woody plants to herbicides, see Bovey 1977, Response of Selected Woody Plants in the United States to Herbicides.

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Alexandergrass (*Brachiaria plantaginea*)	A	I	I	I	E
Alligatorweed (*Alteranthera philoxeroides*)	PN	P	I	I	I
Alyssum, hoary (*Beteroa incana*)	PN	F	F	E	E
Yellow (*Alyssum alyssoides*)	A	E	E	G	E
Amaranth					
Green (*Amaranthus hybridus*)	A	E	E	E	E
Palmer (*A. palmeri*)	A	E	E	E	E
Powell (*A. powellii*)	A	E	E	E	E
Sandhills (*A. arenicola*)	A	E	E	E	E
Spiny (*A. spinosus*)	A	E	E	E	E
See also Pigweed					
Ammannia, pink (*Ammannia teres*)	A	I	E	E	E
Amorpha, leadplant (*Amorpha canescens*)	PN	I	F	I	G
Angelica, purplestem (*Angelica atropurpurea*)	PN	G	G	E	E
Anoda, spurred (*Anoda cristata*)	A	G	G	E	E
Arrowgrass, seaside (*Triglochin maritima*)	PN	F	G	E	E
Arrowhead					
Annual (*Sagittaria calycina*)	A	E	G	E	E
Perennial (*S. longiloba*)	PN	F	I	I	E
Aster					
Many-flowered (*Aster ericoides*)	PN	G	E	E	G
Slender (*A. exilis*)	PN	E	E	E	I
Smooth (*A. laevis*)	PN	G	G	E	G
Spiny (*A. spinosus*)	PN	N	I	F	G
Western (*A. occidentalis*)	PN	P	G	E	G
White heath (*A. pilosus*)	PN	F	F	E	G
Woody (*A. Xylorrhiza parryi*)	PN	P	P	P	P
Baileya, desert (*Baileya multiradiata*)	PN	G	I	I	I
Balloonvine (*Cardiospermum halicacabum*)	PN	G	I	I	E
Baneberry, red (*Actaea rubra*)	PN	I	F	G	G
Barley, foxtail (*Hordeum jubatum*)	PN	N	N	N	G
Little (*H. pusillum*)	A	N	N	N	E
Bassia, five-hook (*Bassia hyssopifolia*)	A	F	G	G	G
Beachgrass, European (*Ammophila arenaria*)	PN	N	N	N	F
Beardgrass, bushy (*Andropogon glomeratus*)	PN	N	N	N	I
Bedstraw					
Cleavers (*Gallium aparine*)	PN	P	G	E	E
Smooth (*G. mollugo*)	PN	N	F	F	G
Beeplant, Rocky Mountain (*Cleome serrulata*)	A	F	I	I	I
Beggarticks, bearded (*Bidens aristosa*)	B	E	E	E	E
Devils (*B. frondosa*)	A	E	E	E	E
Leafbract (*B. comosa*)	A	E	E	E	E
Nodding (*B. cernua*)	A	E	E	E	E
Tall (*B. vulgata*)	A	E	E	E	E
Bellflower, creeping (*Campanula rapunculoides*)	PN	P	F	E	E
Bentgrass, colonial (*Agrostis tenuis*)	PN	N	N	N	E
Creeping (*A. stolonifera*)	PN	N	N	N	E
Velvet (*A. canina*)	PN	N	N	N	E
Bindweed					
Field (*Convolvulus arvensis*)	PN	G	G	G	G
Hedge (*C. sepium*)	PN	G	G	G	G
Biscuitroot (*Lomatium leptocarpum*)	PN	F	I	I	I
Bistort, American (*Polygonum bistortoides*)	PN	F	I	I	I
Bittercress, hairy (*Cardamine hirsuta*)	A	G	E	E	E
Blackeyed susan (*Rudbeckia serotina*)	PN	G	E	E	E
Bloodweed (*Ambrosia aptera*)	A	E	E	E	I
Blueweed, Texas (*Helianthus ciliaris*)	PN	G	E	E	G
Bouncingbet (*Saponaria officinalis*)	PN	P	G	F	F

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Bracken (*Pteridium acquilinum*)	PN	N	G	F	G
Brome, California (*Bromus carinatus*)	A	N	I	I	I
Downy (*B. tectorum*)	A	N	N	P	E
Field (*B. arvensis*)	A	N	N	N	G
Japanese (*B. japonicus*)	A	N	N	P	E
Broomsedge (*Andropogon virginicus*)	PN	N	N	N	E
Broomweed (*Gutierrezia dracunculoides*)	A	G	G	E	F
Broomrape (*Orobanche ramosa*)	A	F	F	I	G
Buckwheat					
Tartary (*Fagopyrum tataricum*)	A	P	E	E	E
Wild (*Polygonum convolvulus*)	A	F	E	E	E
Buffalobur (*Solanum rostratum*)	A	F	F	G	G
Bugloss, common (*Anchusa officinalis*)	PN	I	F	I	G
Bugseed (*Corispermum hyssopifolium*)	A	E	E	E	E
Bullnettle (*Cnidoscolus stimulosus*)	PN	G	G	G	G
Bulrush (*Scirpus spp.*)	PN	F	I	I	I
Burcucumber (*Sicyos angulatus*)	A	P	P	E	E
Burdock, common (*Arctium minus*)	B	E	E	E	G
Great (*A. lappa*)	B	E	G	I	E
Wooly (*A. tomentosum*)	B	E	F	I	E
Bur-head (*Echinodorus cordifolius*)	A	E	I	I	I
Burroweed (*Haplopappus tenuisectus*)	PN	G	E	E	I
Buttercup					
Bur (*Ceratocephalus testiculatus*)	A	P	F	I	I
Celery leaf (*Ranunculus sceleratus*)	A	F	I	I	I
Corn (*R. arvensis*)	A	G	F	F	I
Creeping (*R. repens*)	PN	G	G	F	I
Tall (*R. acris*)	PN	G	G	G	E
Campion, bladder (*Silene vulgaris*)	PN	N	G	E	E
Canarygrass, reed (*Pharlaris arundinacea*)	PN	N	N	N	G
Carpetgrass (*Axonopus affinis*)	PN	F	F	F	E
Carpetweed (*Mollugo verticillata*)	A	E	E	E	E
Carrot, wild (*Daucus carota*)	B	F	G	G	G
Catchfly, night flowering (*Silene noctiflora*)	A	N	E	E	E
Catnip (*Nepeta cataria*)	PN	G	E	E	G
Catsear, spotted (*Hypochoeris radicata*)	PN	G	E	E	I
Cattail					
Broadleaf (*Typha latifolia*)	PN	F	G	G	G
Narrowleaf (*T. angustifolia*)	PN	F	I	I	G
Celandine, greater (*Chelidonium majus*)	B	I	I	G	I
Chamomile, corn (*Anthemis arvensis*)	B	F	G	E	E
Garden (*Chamaemelum nobile*)	A	I	G	I	E
Yellow (*Anthemis tinctoria*)	PN	I	F	I	G
Cheat (*Bromus secalinus*)	A	N	N	F	E
Chervil, wild (*Chaerophyllum tainturieri*)	A	I	G	I	E
Chess, hairy (*Bromus commutatus*)	A	N	N	N	E
Soft (*B. mollis*)	A	N	N	N	E
Chickweed					
Common (*Stellaria media*)	A	F	E	E	E
Field (*Cerastium arvense*)	PN	F	E	E	E
Mouseear (*C. vulgatum*)	PN	F	E	E	E
Sticky (*C. viscosum*)	A	G	E	E	E
Chicory (*Cichorium intybus*)	PN	G	E	E	G
Cinquefoil					
Blueleaf (*Potentilla diversifolia*)	PN	F	I	I	G
Common (*P. canadensis*)	PN	G	E	E	E
Rough (*P. norvegica*)	A	E	E	E	E
Sulfur (*P. recta*)	PN	G	E	E	E

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Clover, hop (*Trifolium agrarium*)	A	F	G	I	E
White (*T. repens*)	PN	F	E	I	F
Cockle					
Corn (*Agrostemma githago*)	A	P	G	E	E
Cow (*Vaccaria pyramidata*)	A	G	E	E	I
White (*Lychnis alba*)	PN	P	G	E	E
Cocklebur, common (*Xanthium pensylvanicum*)	A	E	E	E	E
Coffeeweed (*Daubentonia texana*)	W	E	E	E	E
Coreopsis, plains (*Coreopsis tinctoria*)	A	E	E	G	E
Cornflower					
Batchelor's button (*Centaurea cyanus*)	A	E	E	E	E
Costmary (*Chrysanthemum balsamita*)	PN	F	F	E	G
Cranebill, cutleaf (*Geranium dissectum*)	A				
Creeper, Virginia (*Parthenocissus quniquefolia*)	W	P	F	F	G
Cress, hoary (*Cardaria draba*)	PN	F	G	P	G
Mouseear (*Arabidopsis thaliana*)	A	E	E	E	E
Croton					
Lindheimer (*Croton lindheimeri*)	A	E	E	E	I
Texas (*C. texensis*)	A	E	E	E	I
Wooly (*C. capitatus*)	A	E	E	E	I
Crown vetch (*Coronilla varia*)	PN	G	E	E	G
Cudweed (*Gnaphalium peregrinum*)	A	N	E	E	G
Daisy, English (*Bellis perennis*)	PN	G	G	E	E
Oxeye (*Chrysanthemum leucanthemum*)	PN	F	E	E	G
Dallisgrass (*Paspalum dilatatum*)	PN	N	N	N	F
Dandelion (*Taraxacum officinale*)	PN	E	E	E	G
Darnel (*Lolium temulentum*)	A	I	I	I	E
Dayflower (*Commelina communis*)	A	F	F	P	E
Deadnettle, red (*Lamium purpureum*)	A	P	E	E	E
Deathcamas (*Zigadenus gramineus*)	PN	F	E	E	G
Foothill (*Z. paniculatus*)	PN	G	I	I	I
Deerweed (*Lotus scoparius*)	W	E	I	I	I
Devil's claw (*Proboscidea louisianica*)	A	E	E	E	E
Dill (*Anethum graveolens*)	A	E	E	E	E
Dock					
Broadleaf (*Rumex obtusifolius*)	PN	F	E	E	E
Curly (*R. crispus*)	PN	F	E	E	G
Fiddle (*R. pulcher*)	PN	E	G	E	E
Pale (*R. altissimus*)	PN	G	G	E	E
Veiny (*R. venosus*)	PN	F	I	I	I
Dodder					
Largeseed (*Cuscuta indecora*)	A	P	I	I	E
Smallseed alfalfa (*C. pentagona*)	A	P	I	I	I
Dogbane, hemp (*Apocynum cannabinum*)	PN	F	F	G	G
Prairie (*A. sibericum*)	PN	P	F	F	G
Spreading (*A. androsaemifolium*)	PN	P	F	F	G
Duckweed, common (*Lemna minor*)	A	P	N	N	N
Evening primrose, common (*Oenothera biennis*)	B	E	E	E	E
False boneset (*Kunia eupatoriodies*)	PN	G	F	E	G
Falseflax, smallseeded (*Camelina microcarpa*)	A	E	E	E	I
Fennel, dog (*Eupatorium capillifolium*)	A	G	E	E	G
Fescue, sixweeks (*Vulpia octoflora*)	A	N	N	N	E
Fiddleneck, coast (*Amsinckia intermedia*)	A	G	E	G	E
Fieldcress, yellow (*Roripa sylvestris*)	PN	G	F	G	G
Filaree, redstem (*Erodium cicutarium*)	A	G	E	E	F
Fireweed (*Epilobium angustifolium*)	PN	G	I	I	I

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Fleabane					
Annual (*Erigeron annuus*)	A	F	E	E	E
Oregon (*E. speciosus*)	PN	F	F	G	E
Rough (*E. strigosus*)	A	G	E	E	E
Flixweed (*Descurainia sophia*)	A	E	I	G	I
Florida betony (*Stachys floridana*)	PN	P	F	G	G
Foxtail, meadow (*Alopecurus pratensis*)	PN	N	P	N	E
Slender (*A. myosuroides*)	PN	N	N	N	E
Water (*A. geniculatus*)	PN	I	I	I	E
West India (*Andropogon bicornis*)	PN	N	N	N	I
Franseria					
Bur (*Franseria discolor*)	PN	F	G	E	G
Woollyleaf (*F. tomentosa*)	PN	F	F	F	F
Galinsoga, hairy (*Galinsoga ciliata*)	A	G	E	E	E
Smallflower (*G. parviflora*)	A	E	E	E	E
Garlic, wild (*Allium vineale*)	PN	F	F	G	P
Geranium, Carolina (*Geranium carolinianum*)	A	G	E	E	E
Goatgrass, barb (*Aegilops triuncialis*)	A	N	P	N	E
Jointed (*A. cylindrica*)	A	N	P	N	E
Goatsrue (*Galega officinalis*)	PN	F	G	E	F
Goldenrod (*Solidago spp.*)	PN	F	G	E	E
Goosefoot					
Blite (*Chenopodium capitatum*)	A	E	E	E	E
Jerusalem-oak (*C. botrys*)	A	F	E	E	E
Mapleleaf (*C. hybridum*)	A	E	E	E	E
Nettleleaf (*C. murale*)	A	E	E	E	E
Oakleaf (*C. glaucum*)	A	E	E	E	E
Gooseweed (*Sphenoclea zeylanica*)	A	F	I	I	I
Gourd, buffalo (*Curcurbita foetidissima*)	PN	P	I	I	I
Goutweed, Bishops (*Aegopodium podagraria*)	PN	N	I	I	I
Grama, six weeks needle (*Bouteloua aristidoides*)	A	N	I	I	E
Gromwell (*Lithospermum officinale*)	PN	N	E	I	E
Groundcherry					
Clammy (*Physalis heterophylla*)	PN	N	E	E	I
Purple flower (*P. lobata*)	PN	N	I	I	I
Smooth (*P. subglabrata*)	PN	F	F	I	P
Wrights (*P. acutifolia*)	A	E	E	E	E
Ground-ivy (*Glechoma hederacea*)	PN	F	G	E	G
Groundsel					
Arrowleaf (*Senecio triangularis*)	PN	F	I	I	E
Common (*S. vulgaris*)	A	P	E	I	E
Cressleaf (*S. glabellus*)	A	E	I	I	E
Riddell (*S. riddellii*)	PN	E	E	I	E
Threadleaf (*S. longilobus*)	PN	F	G	E	E
Guineagrass (*Panicum maximum*)	PN	N	N	N	E
Gumweed (*Grindelia squarrosa*)	PN	E	G	E	G
Hairgrass, silver (*Aira caryophyllea*)	A	N	N	N	E
Halogeton (*Halogeton glomeratus*)	A	F	I	I	I
Hawksbeard, smooth (*Crepis capillaris*)	A	P	I	I	I
Hawkweed					
Orange (*Hieracium aurantiacum*)	PN	F	G	E	G
Yellow (*H. caespitosum*)	PN	F	G	E	E
Healall (*Prunella vulgaris*)	PN	G	G	I	G
Hellebore, false western (*Veratrum californicum*)	PN	G	P	I	I
Hemlock, poison (*Conium maculatum*)	B	G	E	E	G
Hemp (*Cannabis sativa*)	A	G	G	E	E

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Hempnettle (*Galeopsis tetrahit*)	A	P	I	I	I
Henbit (*Lamium amplexicaule*)	A	P	E	E	E
Hogpeanut (*Amphicarpa bracteata*)	PN	E	I	I	I
Hogpotato (*Hoffmanseggia densiflora*)	PN	F	I	I	I
Hollyhock (*Althea rosea*)	B	E	G	E	E
Honeysuckle (*Lonicera japonica*)	PN	F	G	E	G
Horehound, white (*Marrubium vulgare*)	PN	E	G	G	I
Horsebrush, littleleaf (*Tetradymia glabrata*)	PN	P	G	E	I
Horsenettle, Carolina (*Solanum carolinense*)	PN	P	F	G	G
Horsetail, field (*Equisetum arvense*)	PN	P	N	F	P
Horseweed, marestail (*Conyza canadensis*)	A	F	E	E	E
Houndstongue (*Cynoglossum officinale*)	B	F	G	E	I
Indiantobacco (*Lobelia inflata*)	A	F	E	I	I
Iris, Rocky Mountain (*Iris missouriensis*)	PN	F	G	E	E
Ironweed, Western (*Vernonia baldwinii*)	PN	F	G	E	E
Itchgrass (*Rottboellia exaltata*)	PN	I	I	I	E
Ivy, English (*Hedera helix*)	PN	I	E	E	F
Jerusalem artichoke (*Helianthus tuberosus*)	PN	F	P	F	F
Jewelweed (*Impatiens pallida*)	A	E	E	E	E
Jimmyweed (*Haplopappus pluriflorus*)	PN	F	I	I	I
Jimsonweed (*Datura stramonium*)	A	P	F	E	E
Jobs tears (*Coix lacryma*)	A	E	I	I	I
Johnsongrass (*Sorghum halepense*)	PN	N	N	N	E
Jointvetch, Northern (*Aeschynomene virginica*)	A	F	I	I	I
Knapweed					
Black (*Centaurea nigra*)	PN	F	F	E	G
Brown (*C. jacea*)	PN	F	I	I	I
Diffuse (*C. diffusa*)	A,B,PN	E	E	E	I
Russian (*C. repens*)	PN	P	G	G	G
Spotted (*C. maculosa*)	B,PN	F	E	E	E
Squarrose (*C. virgata var. squarrosa*)	PN	F	I	I	I
Vochin (*C. nigrescens*)	PN	I	I	I	E
Knawel (*Scleranthus annuus*)	A	N	E	E	E
Knotweed					
Japanese (*Polygonum cuspidatum*)	PN	P	F	G	G
Prostrate (*P. aviculare*)	A	P	E	E	E
Sakhalin (*P. sachalinense*)	PN	G	P	G	G
Silversheath (*P. argyrocoleon*)	A	F	F	E	G
Kochia (*Kochia scoparia*)	A	E	G	F	E
Kudzu (*Pueraria lobata*)	PN	F	G	E	G
Lambsquarters (*Chenopodium album*)	A	E	E	E	E
Netseed (*C. berlandieri*)	A	E	E	E	E
Larkspur					
Duncecap (*Delphinium occidentale*)	PN	N	I	I	I
Little (*D. bicolor*)	PN	N	I	I	I
Menzies (*D. menziesii*)	PN	F	I	I	I
Tall (*D. barbeyi*)	PN	N	G	E	G
Leek, wild (*Allium tricoccum*)	PN	F	F	P	F
Lespedeza (*Lespedeza striata*)	A	P	G	I	G
Sericea (*L. cuneata*)	PN	P	G	I	F
Lettuce					
Blue (*Lactuca pulchella*)	PN	F	G	E	G
Wild (*L. serriola*)	A	E	E	E	E
Loco, bigbend (*Astragalus earlei*)	A	E	I	I	I
Blue (*A. lentiginosus var. diphysus*)	PN	G	G	E	E
Woolly (*A. mollissimus*)	PN	G	G	E	E
Locoweed, white (*Oxytropis lambertii*)	PN	F	G	E	I

Plant Name	**Type of Plant**	**2,4-D**	**Dicamba**	**Picloram**	**Glyphosate**
London rocket, annual (*Sisymbrium irio*)	A	E	I	I	I
Lupine					
Silver (*Lupinus argenteus*)	PN	F	E	E	F
Tailcup (*L. caudatus*)	PN	G	I	I	I
Maidencane (*Panicum hemitomon*)	PN	I	I	I	E
Mallow					
Common (*Malva neglecta*)	A	P	G	E	E
Dwarf (*M. rotundiflora*)	PN	F	G	E	G
Little (*M. parviflora*)	A	F	E	E	G
Venice (*Hibiscus trionum*)	A	G	E	E	G
Marshelder (*Iva xanthifolia*)	A	E	E	E	E
Mayweed, dogfennel (*Anthemis cotula*)	A	F	E	E	E
Medic, black (*Medicago lupulina*)	A	F	G	E	G
Medusahead (*Taeniatherum asperum*)	A	N	N	N	E
Mexican weed (*Caperonia palustris*)	A	F	I	I	E
Mexicantea (*Chenopodium ambrosioides*)	A	E	E	E	E
Milkvetch, cicer (*Astragalus cicer*)	PN	E	E	E	E
Nuttail (*A. nuttallianus*)	PN	G	G	E	E
Timber (*A. miser*)	PN	I	I	I	I
Milkweed, bloodflower (*Asclepias curassavica*)	PN	G	P	G	G
Broadleaf (*A. latifolia*)	PN	F	P	G	E
Butterfly (*A. tuberosa*)	PN	P	P	G	G
Climbing (*Funastrum cynanchoides*)	PN	F	P	I	F
Common (*Asclepias syriaca*)	PN	P	F	G	F
Eastern whorled (*A. verticillata*)	PN	N	G	F	G
Green (*A. viridiflora*)	PN	P	P	G	G
Purple (*A. purpurascens*)	PN	P	P	G	G
Showy (*A. speciosa*)	PN	N	F	E	G
Swamp (*A. incarnata*)	PN	P	P	G	G
Western whorled (*A. subverticillata*)	PN	I	I	E	I
Mint, field (*Mentha arvensis*)	PN	G	F	E	E
Moneywort (*Lysimachia nummularia*)	PN	E	I	I	G
Morningglory					
Bigroot (*Ipomoea pandurata*)	PN	F	P	F	F
Common (*I. purpurea*)	A	E	E	E	E
Ivyleaf (*I. hederacea*)	A	E	E	E	E
Woolly (*I. hirsutula*)	A	E	G	E	E
Mother-of-thyme (*Acinos thymoides*)		G	E	E	E
Mudplantain (*Heteranthera limosa*)	PN	E	I	I	I
Mugwort (*Artemisia vulgaris*)	PN	P	F	G	F
Mulesears (*Wyethia amplexicaulis*)	PN	G	G	E	F
Mullein					
Common (*Verbascum thapsus*)	B	P	G	E	G
Moth (*V. blattaria*)	B	F	F	G	E
Mustard					
Black (*Brassica nigra*)	A	E	E	G	E
Blue (*Chorispora tenella*)	A	F	G	E	E
Haresear (*Conringia orientalis*)	A	E	E	E	E
Hedge (*Sisymbrium officinale*)	A	E	E	E	E
Indian (*Brassica juncea*)	A	E	E	E	E
Tansy (*Descurainia pinnata*)	A	E	E	E	E
Treacle (*Erysimum repandum*)	A	G	F	I	I
Tumble (*Sisymbrium altissimum*)	A	E	E	E	G
Wild (*Sinapis arvensis*)	A	E	E	E	E
Wormseed (*Erysimum cheiranthoides*)	A	E	E	E	E
Nettle					
Stinging (*Urtica dioica*)	PN	G	G	G	G
Tall (*U. procera*)	A	G	E	E	E

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Niggerhead (*Rudbeckia occidentalis*)	PN	G	E	E	I
Nightshade					
Black (*Solanum nigrum*)	A	F	G	E	E
Cutleaf (*S. triflorum*)	A	I	F	I	I
Silverleaf (*S. elaeagnifolium*)	PN	P	G	E	E
Nimblewill (*Muhlenbergia schreberi*)	PN	N	N	N	E
Norcal bean (*Sophora secundiflora*)	PN	I	I	I	I
Nutsedge					
Purple (*Cyperus rotundus*)	PN	P	F	P	G
Yellow (*C. esculentus*)	PN	F	N	F	F
Oats, slender (*Avena barbata*)	A	I	N	I	I
Wild (*A. fatua*)	A	N	N	N	E
Onion, wild (*Allium canadense*)	PN	F	F	P	F
Orache (*Atriplex hastata*)	A	I	G	I	I
Paragrass (*Brachiaria mutica*)	PN	N	N	N	G
Parsley, desert (*Lomatium grayi*)	PN	E	E	E	E
Parsnip, wild (*Pastinaca sativa*)	B	E	E	E	I
Partridgepea (*Cassia fasciculata*)	A	E	E	E	E
Paspalum, field (*Paspalum laeve*)	PN	I	I	I	E
Passionflower, Maypop (*Passiflora incarnata*)	PN	F	F	F	F
Peavine (*Astragalus emoryanus*)	A	G	I	I	I
Pellitoryweed (*Parietaria floridana*)	A	N	I	I	I
Pennycres, field (*Thlaspi arvense*)	A	E	E	E	E
Pennywort, lawn (*Hydrocotyle sibthorpioides*)	PN	G	E	I	I
Penstemon, Rydberg (*Penstemon rydbergii*)	PN	F	I	I	I
Pepperweed					
Field (*Lepidium campestre*)	A	E	E	E	E
Perennial (*L. latifolium*)	PN	F	G	F	I
Virginia (*L. virginicum*)	A	E	E	E	E
Yellowflower (*L. perfoliatum*)	A	E	I	I	I
Pheasanteye (*Adonis annua*)	A	F	I	I	I
Pickerelweed (*Pontederia cordata*)	PN	I	I	I	G
Pigweed					
Prostrate (*Amaranthus blitoides*)	A	E	E	E	E
Redroot (*A. retroflexus*)	A	E	E	E	E
Tumble (*A. albus*)	A	E	E	E	E
Tumbleweed (*A. graecizans*)	A	E	E	E	E
Pimpernel, scarlet (*anagallis arvensis*)	A	E	E	E	E
Pineappleweed (*Chamomilla suaveolens*)	A	F	E	E	G
Plantain					
Blackseed (*Plantago rugelii*)	PN	E	E	E	E
Bracted (*P. aristata*)	A	E	E	E	E
Broadleaf (*P. major*)	PN	E	G	E	G
Buckhorn (*P. lanceolata*)	PN	E	G	E	E
Poison ivy (*Toxicodendron radicans*)	W	F	G	E	G
Poison oak (*T. toxcarium*)	W	F	F	G	G
Pokeweed (*Phytolacca americana*)	PN	F	G	E	E
Pondweed (*Potamogeton spp.*)	PN	E	I	I	I
Ponyfoot (*Dichondra repens*)	PN	E	E	E	E
Poorjoe (*Diodia teres*)	A	G	E	E	E
Poppy, Roemer (*Roemeria refracta*)	A	E	I	I	I
Poverty grass (*Aristida dichotoma*)	A	N	N	N	E
Povertyweed (*Iva axillaris*)	PN	G	G	G	G
Prickleypoppy (*Argemone intermedia*)	A	E	I	I	I
Puncturevine (*Tribulus terrestris*)	A	G	E	E	E
Purslane, common (*Portulaca oleracea*)	A	F	E	E	E
Pusley, Florida (*Richardia scabra*)	A	E	E	E	I
Pussytoes, field (*Antennaria neglecta*)	PN	G	G	E	E

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Plantainleaf (*A. plantaginifolia*)	PN	G	G	E	E
Quackgrass (*Agropyron repens*)	PN	N	N	N	G
Queensdelight (*Stillingia slyvatica*)	PN	N	N	N	G
Rabbitbrush					
Gray (*Chrysothamnus nauseosus*)	W	F	I	I	I
Yellow (*C. viscidiflorus*)	W	F	G	E	I
Radish, wild (*Raphanus raphanistrum*)	A	G	G	G	P
Ragweed	A	G	E	E	E
Blood (*Ambrosia texana*)	A	E	E	E	I
Common (*A. artemisiifolia*)	A	F	E	E	E
Giant (*A. trifida*)	A	F	E	E	E
Lanceleaf (*A. bidentata*)	A	E	E	E	E
Western (*A. psilostachya*)	PN	G	E	E	I
Ragwort, tansy (*Senecio jacobaea*)	PN	G	I	I	I
Rape, bird (*Brassica rapa*)	B	E	I	I	I
Redstem (*Ammannia coccinea*)	A	E	I	I	G
Redtop (*Agrostis gigantea*)	PN	N	I	I	I
Redvine (*Brunnichia cirrhosa*)	PN	N	G	G	G
Reed, common (*Phragmites australis*)	PN		G	G	G
Giant (*Arundo donax*)	PN	N	N	N	I
Rhodesgrass (*Chloris gayana*)	PN	N	N	N	I
Rockcress, tower-mustard (*Arabis glabra*)	PN	E	G	E	G
Virginia (*A. virginica*)	A	E	E	E	E
Rubberweed					
Bitter (*Hymenoxys odorata*)	A	E	F	E	I
Colorado (*H. richardsoni*)	PN	G	I	I	I
Rue, African (*Peganum harmala*)	PN	I	I	I	I
Sage					
Creeping (*Salvia sonomensis*)	PN	G	I	I	I
Purple (*S. leucophylla*)	PN	G	I	I	I
White (*S. apiana*)	PN	G	I	I	I
Sagewort, prairie (*Artemisia campestris*)	PN	G	G	E	E
Wild green (*A. caudata*)	PN	G	G	E	E
Salisfy					
Common (*Tragapogon porrifolius*)	B	G	I	I	I
Meadow (*T. pratensis*)	B	G	E	E	I
Sandbur, field (*Cenchrus incertus*)	B	N	N	N	E
Longspine (*C. longispinus*)	A	N	N	N	E
Southern (*C. echinatus*)	A				
Sandwort, thymeleaf (*Arenaria serpyllifolia*)	A	E	G	I	E
Sedge, beaked (*Carex rostrata*)	PN	N	N	N	G
Hop (*C. lupulina*)	PN	N	N	N	G
Ripgut (*C. lacustris*)	PN	N	N	N	G
Sugargrass (*C. atherodes*)	PN	N	N	N	G
Umbrella (*Cyperus difformis*)	A	F	I	I	I
Water (*Carex aquatilis*)	PN	N	N	N	G
Woolfruit (*C. lasiocarpa*)	PN	N	N	N	G
Senna, coffee (*Cassia occidentalis*)	A	G	E	E	E
Sensitive (*C. nictitans*)	A	G	E	E	E
Sicklepod (*C. obtrusifolia*)	A	F	E	E	E
Wild (*C. marilandica*)	PN	P	G	G	E
Sesbania, coffeebean (*Sesbania exaltata*)	A	F	E	E	G
Shepherdspurse (*Capsella bursa-pastoris*)	A	G	E	E	E
Sida, prickly (*Sida spinosa*)	A	E	E	E	E
Signalgrass, broadleaf (*Brachiaria platyphylla*)	A	N	I	I	G
Fringed (*B. ciliatissima*)	PN	N	N	N	I
Skeletonweed, rush (*Chondrilla juncea*)	PN	F	G	E	I
Skunkcabbage (*Symplocarpus foetidus*)	PN	G	I	I	G

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Smartweed		I	I	I	G
Ladysthumb (*Polygonum persicaria*)	A	G	E	E	E
Pennsylvania (*P. pensylvanicum*)	A	G	E	E	E
Water (*P. amphibium*)	PN	P	F	F	G
Snakeroot, white (*Eupatorium rugosum*)	PN	F	I	I	I
Snakeweed					
Broom (*Gutierrezia sarothrae*)	PN	F	G	E	F
Threadleaf (*G. microcephala*)	PN	G	I	E	I
Snapdragon (*Antirrhinum majus*)	A	I	I	I	E
Sneezeweed (*Helenium autumnale*)	PN	G	F	G	G
Bitter (*H. tenuifolium*)	A	E	F	G	G
Snow-on-the-mountain (*Euphorbia marginata*)	A	F	E	E	G
Sorrel (*Rumex acetosa*)	PN	G	E	E	E
Heartwing (*R. hastatulus*)	PN	E	E	E	E
Red (*R. acetosella*)	PN	N	E	E	E
Sowthistle					
Annual (*Sonchus oleraceus*)	A	E	E	E	E
Perennial (*S. arvensis*)	PN	F	G	G	G
Spiny (*S. asper*)	A	E	E	E	E
Spanishneedles (*Bidens bipinnata*)	A	E	E	E	E
Spatterdock (*Nuphar lutea macrophylla*)	PN	I	I	I	E
Speedwell					
Common (*Veronica officinalis*)	PN	P	F	I	I
Corn (*V. arvensis*)	A	P	F	I	I
Purslane (*V. peregrina*)	A	F	F	I	I
Spikerush (*Eleocharis macrostachya*)	PN	F	I	I	I
Spurge					
Flowering (*Euphorbia corollata*)	PN	P	G	E	I
Leafy (*E. esula*)	PN	P	F	G	F
Spotted (*E. maculata*)	A	P	E	E	G
Spurry, corn (*Spergula arvensis*)	A	P	G	E	I
St. Johnswort (*Hypericum perforatum*)	PN	P	I	I	I
Spotted (*H. punctatum*)	PN	F	I	I	I
Star-of-Bethlehem (*Ornithogalum umbellatum*)	PN	N	N	N	G
Starbur, bristly (*Acanthospermum hispidum*)	A	P	G	E	E
Paraguay (*A. Australe*)	A	P	G	E	E
Starthistle, malta (*Centaurea melitensis*)	A	E	E	E	I
Purple (*C. calcitrapa*)	B	E	G	G	E
Yellow (*C. solstitialis*)	A	F	G	E	E
Sticktight, European (*Lappula echinata*)	A	G	I	I	I
Strawberry, wild (*Fragaria spp.*)	PN	P	G	G	G
Sumpweed, rough (*Iva ciliata*)	A	E	E	E	I
Sunflower (*Helianthus annuus*)	A	E	E	E	E
Sweetclover, annual yellow (*Melilotus indica*)	A	E	E	E	E
Sweetflag (*Acorus calamus*)	PN		G	I	I
Swinecress (*Coronopus didymus*)	B	E	E	E	E
Tansy (*Tanacetum vulgare*)	PN	F	G	E	E
Tansymustard (*Descurainia pinnata*)	A	E	E	E	E
Thistle					
Blessed (*Cnicus benedictus*)	A	E	E	E	I
Blue (*Echium vulgare*)	B	F	E	E	E
Bristly (*Cirsium horridulum*)	B	F	E	E	I
Bull (*C. vulgare*)	B	E	E	E	E
Canada (*C. arvense*)	PN	F	E	E	G
Flodman (*C. flodmanii*)	PN	G	G	E	G
Italiam (*Carduus pycnocephalus*)	A	G	E	E	I
Marsh (*Cirsium palustre*)	B	G	E	E	G
Milk (*Silybum marianum*)	B	E	E	I	I

Plant Name	Type of Plant	2,4-D	Dicamba	Picloram	Glyphosate
Mush (*Carduus nutans*)	B	E	G	E	E
Pasture (*Cirsium pumilum*)	B	E	E	E	E
Plumeless (*Carduus acanthoides*)	B	G	G	E	E
Russian (*Salsola iberica*)	A	G	E	E	G
Wavyleaf (*Cirsium undulatum*)	PN	G	G	E	G
Welted (*Carduus crispus*)	B	E	E	E	E
Western (*Cirsium occidentale*)	B	G	E	E	G
Yellowspine (*C. ochrocentrum*)	PN	F	G	E	G
Threeawn, prairie (*Aristida oligantha*)	A	N	N	N	E
Red (*A. longiseta*)	PN	N	N	N	F
Reverchon (*A. glauca*)	PN	N	N	N	I
Sixweeks (*A. adscencionis*)	A	N	N	I	I
Tickseed (*Coreopsis tinctoria*)	A	G	E	E	I
Toadflax					
Blue (*Linaria canadensis*)	PN	P	I	I	I
Dalmatian (*L. dalmatica*)	PN	F	G	G	G
Yellow (*L. vulgaris*)	PN	N	F	G	G
Torpedograss (*Panicum repens*)	PN	I	I	I	G
Trumpet creeper (*Campsis radicans*)	PN	P	G	E	G
Velevtleaf (*Abutilon therophrasti*)	A	G	F	E	E
Velvetgrass (*Holcus lanatus*)	PN	I	N	N	E
Vervian					
Blue (*Verbena hastata*)	PN	E	E	I	I
Hoary (*V. stricta*)	PN	G	I	I	I
Prostrate (*V. bracteata*)	PN	E	I	I	I
Roadside (*V. bonariensis*)	PN	G	E	I	I
Vetch					
Narrowleaf (*Vicia angustifolia*)	A	E	E	E	E
Milk (*Astragalus miser*)	PN	G	E	E	G
Two grooved (*A. bisulcatus*)	PN	E	I	I	I
Wild (*Vicia spp.*)	A	E	E	E	G
Violet (*Viola spp.*)	PN	P	F	G	G
Water hyacinth (*Eichhornia crassipes*)	PN	G	I	I	G
Waterhemlock, spotted (*Cicuta maculata*)	PN	G	E	E	G
Waterhemp (*Amaranthus tamariscinus*)	A	E	E	E	E
Tall (*A. tuberculatus*)	A	E	E	E	E
Waterplantain (*Alisma triviale*)	PN	E	I	I	I
Waterweed, Canada (*Elodea canadensis*)	PN	F	I	I	I
Whitetip (*lenspodded (Cardaria repens*)	PN	P	F	F	G
Windmillgrass (*Chloris verticillata*)	PN	N	N	N	G
Wintercress, early (*Barbarea verna*)	PN	E	E	E	E
Wirestem muhley (*Muhlenbergia frondosa*)	PN	N	N	N	E
Witchgrass, (*Panicum capillare*)	A	N	N	N	E
Witchweed (*Striga asiatica*)	A	E	I	I	E
Woad, Dyers (*Isatis tinctoria*)	PN	G	E	G	G
Woodsorrel, yellow (*Oxalis stricta*)	PN	P	G	E	E
Wormwood, annual (*Artemisia annua*)	A	G	E	E	I
Biennial (*Artemisia biennis*)	B	E	G	E	E
Louisiana (*Artemsia ludoviciana*)	PN	F	G	E	G
Yankeeweed (*Eupatorium compositifolium*)	PN	F	I	I	E
Yarrow					
Common (*Archillea millefolium*)	PN	P	G	E	G
Sneezewort (*A. ptarmica*)	PN	F	G	I	I
Western (*A. lanulosa*)	PN	F	F	G	I
Yellow rocket (*Barbarea vulgaris*)	PN	F	G	E	E
Yucca, plains (*Yucca glauca*)	PN	N	P	F	P

Compiled from Klingman and others, 1983.

Appendix F Status of Biocontrol Agents in the EIS Area[1]

(Compiled from Nowierski 1985 and Isaacson and Ehrensing 1977)

Euphorbia pseudovirgata (_E. esula_ x _virgata_ complex) leafy spurge

Hyles euphorbiae - leafy spurge hawkmoth
-Moth has established on leafy spurge at two locations in Montana near Bozeman and Missoula.
-No other reports of establishment of the moth in the EIS area.
-Redistribution of moth a possibility this year.
-Moth larvae defoliate plant.

Oberea erythcrocephala - stem and root boring beetle
-Beetle has established at possibly two locations in Montana.
-Population levels are still too low for redistribution.

Chamaesphecia tenthrediniformis - clear winged moth
-Failed to establish on our type of leafy spurge.

Apthona flava - flea beetle
-Screening research completed.
-May get approval for release in 1986.
-Adults chew shot holes in the leaves; larvae feed on roots.

Lobesia euphorbiana - leaf tying moth
-Screening research continuing.
-Larvae tie up the leaves and feed internally, destroying the shoot and preventing seed production.

Bayeria capitigena - gall forming midge
-Screening research completed.
-May get approval for release in 1986.
-Larvae gall up the seed producing region of the plant, reducing seed production.

Centaurea maculosa - spotted knapweed

Urophora affinis and *U. quadrifasciata* - seed head flies
-Both Species well established throughout EIS area (Idaho, Montana, Oregon, Washington, and Wyoming).
-Redistribution efforts are going on annually in Missoula, Montana.
-Larvae form galls in seed head, reducing amount of seed produced, and act as metobolic sink stressing plant.

Metzneria paucipunctella - seed head moth
-Moth established in small population in Idaho, Oregon, and Washington.
-Climate apparently too severe in Montana for establishment.
-Larvae destroy seed.

Pelochrista medullana - root boring moths
-Released in Montana near Missoula in 1984.
-Status of moth not known.
-Larvae destroy young rosettes.

Centaurea diffusa - diffuse knapweed

Urophora affinis and U. quadrifasciata
-See information on flies under spotted knapweed.

Sphenoptera jugoslavica - root boring beetle
-Believed established in Washington.
-Collections possible from Canada, where beetle is well established. Established in Oregon.

Agapeta zoegana - root boring moth
-Released near Missoula, Montana in 1984.
-Status of moth unclear.
-Larvae destroy young rosettes.

Cirsium arvense - Canada thistle

Ceutorhynchus litura - stem boring beetle
-Established at a few sites in Montana.
-Slow to increase and spread on its own.

Urophora cardui - gall fly
-Established at one location in Montana at low population levels.
-Status in other states not known.

Linaria dalmatica - dalmatian toadflax

Calophasia lunula - defoliating moth
-Released in Montana a number of times.
-No report of establishment in EIS area.
-Need economic data on dalmatian toadflax before

more agents are released (conflict with snapdragons)

Carduus nutans - musk thistle

Rhinocyllus conicus - seed head weevil
-Weevil apparently well established in EIS area, particularly in Montana.
-Larvae effectively destroy the seed producing region of the flower heads, possibly dramatically reducing seed production. However, mush thistle is still a problem in areas of the seed head weed establishment.

Trichosirocalus horridus - crown feeding weevil
-Releases have been made in Montana in 2 different years.
-No report of establishment yet.
-Larvae destroy the meristem of the plant, causing lateral shoot growth and a more prostrate plant that can't compete as well.

Ceutorhynchus trimaculatus - crown feeding weevil
-Screening research continuing.
-Same type of damage as Trichosirocalus horridus.

Salsola pestifer - Russian thistle

Coleophora klimeschiella - leaf mining moth
-Releases made in Montana in past.
-Status unknown.

Hypericum perforatum - Klamath weed, goat weed, St. Johnswort

Chrysolina quadrigemina - defoliating beetle
-Beetle well established in EIS area. Where well established often provides 90+% successful control.

Agrilus hyperici - root boring beetle
-Well established in California and probably Oregon, Idaho, and Washington.
-No report of establishment in Montana.
-Impact has not been investigated.

Zeuxidiplosis giardi - gall forming midge
-Released in a number of states in EIS area.
-No report of establishment or effect in the Northwest.
-Larvae form galls on stem of plant.

Senecio jacobaea - tansy ragwort

Tyria jacobaeae - defoliating moth (cinnabar moth)
-Well established in Washington and Oregon.
-Weed a problem in western Washington and Oregon.
-Released in Oregon in 1960.
-Research has found that cinnabar moth can reduce ragwort populations by 50-75 percent or more on sites favorable for their survival.
-Larvae destroy foliage.

Hylemya seneciella - seed fly
-Released in Oregon in 1976.
-Larvae consume or damage the maturing seed.
-Established in Oregon.

Longitarsus jacobaeae - flea beetle
-First released in Oregon in 1971.
-At least 80 successful releases have been made in Oregon.
-Larvae feed on lower leaf petioles and extensively mine ragwort roots.
-Introductions are too recent to draw conclusions about the beetle's ability to reduce ragwort densities.

[1] It is too early to assess the effect of some biological agtents in the nocious weeds. For example: *Obecea, Metznecia, Pelochrista, Urophora, Ceatorhynchus* and *Colepnorea*. In other cases an individual biological agent does not provide adequate weed control. Therefore a complex of 3 or more biological agents are requires to accomplish an economic control level.

There are periodic severe outbreaks of weeds due to a breakdown of control because of insufficient populations of biological agents. Often times climatic conditions have severe adverse impacts on biological agent populations.

Appendix G
Terrestrial Plant Susceptibility to Picloram, Dicamba, and 2,4-D

Appendix G
Terrestrial Plant Succeptibility to Picloram, Dicamba, and 2,4-D [1]

	Susceptibility[2]		
	Picloram	Dicamba	2,4-D Ester
Douglas-Fir (*Pseudotsuga menziesii*)	SI	S	I-R
Lodgepole Pine (*Pinus contorta*)	MS	-	-
Spruce (*Picea spp.*)	I	I-R	I-R
Juniper (*Juniperus spp.*)	MS-S	S-I	R
Willow (*Salix spp.*)	S	S-I	S
Cottonwood (*Populus spp.*)	S	S	S-I
Alder (*Alnus spp.*)	S	S	S-I
Quaking Aspen (*Populus tremuloides*)	S	S	S-I
Big Sagebrush (*Artemisia tricentata*)	R	S	S-I[5]
Fringed Sagebrush (*Artemisia frigida*)	S	S[3]	S
True Mountain Mahogany (*Cercocarpus montanus*)	S	S[3]	I
Rubber Rabbitbrush (*Chrysothamnus nauseousus*)	S	S-I[4]	S
Black Greasewood (*Sarcobatus vermiculatus*)	S	S	S
Serviceberry (*Amelanchier spp.*)	-	-	S-I
Shrubby Cinquefoil (*Potentilla fruticosa*)	MS-S[4]	S[3]	S-I[4]
Antelope Bitterbrush (*Purshia tridentata*)	S[3]	S[3]	S[3]
Snowberry (*Symplocarpus occidentalis*)	MS	S[3]	S-I
Lupine (*Lupinus spp.*)	S[3]	S[3]	S-I
Geranium (*Geranium spp.*)	S	S	S-I
Clover (*Trifolium spp.*)	S	-	S
Alfalfa (*Medicogo sativa*)	S	S[3]	S[3]
Indian Ricegrass (*Oryzopsis hymenoides*)	R[3]	R[3]	R
Bluegrass (*Poa spp.*)	R	R[3]	R
Thickspike Wheatgrass (*Agropyron dasystachym*)	R[3]	R[3]	R[4]
Western Wheatgrass (*Agropyron smithii*)	R[3]	R[3]	R[4]
Idaho Fescue (*Festuca idahoensis*)	R[3]	R[3]	R[4]
Spike Fescue (*Festuca kingii*)	R[3]	R[3]	R[4]

[1] Taken from USDI, BLM 1982, this table is a compilation of data from the following sources: Dow Chemical Co. 1979; Klingman 1961; Bovey 1977; Alley 1978.

[2] R-resistant, MS-moderately susceptible, S-susceptible, I-severely injured or partially controlled by 1 lb/acre or less of 2,4-D. S-I - Control of plant falls between the susceptible and intermediate class.

[3] Source: Alley 1978

[4] Studies by the authors shown above found the susceptibilty of different species within a given genus. Generally members within the same genus respond similarly to the same herbicide.

[5] The ester formulations are effective on big sagebrush, but the amine formulations little affect this species.

Appendix H
Annual Acres of Noxious Weed Treatment

H-1. Estimated Annual Acres of Weed Treatment by Alternative and State

H-2. Estimated Annual Acres of Chemical Treatment by Method, Herbicide Use, Alternative, and State

Appendix H-1.
Estimated Annual Acres of Weed Treatment by Alternative and State

Treatments (acres)	Alternative 1 (Proposed Action)						Alternative 2 (No Aerial Horbicide Application)					
	ID [1]	MT [2]	OR	WA	WY	Total	ID	MT	OR	WA	WY	Total
Chemical												
helicopter	2,000	3,200	0	400	300	5,900	0	0	0	0	0	0
ground vehicular	5,290	2,100	5,765	20	490	13,665	5,790	2,800	5,765	80	565	15,000
ground hand	500	300	383	5	490	1,678	1,250	550	383	105	665	2,953
Manual												
hand pulling	0	0	0	4	0	4	0	0	0	4	0	4
hand tools	5	15	252	0	0	272	10	15	252	0	0	277
Mechanical												
mowing	0	0	0	10	0	10	0	0	0	10	0	10
tilling	0	0	190	0	0	190	0	0	190	0	0	190
burning	200	100	300	0	0	600	200	200	300	0	0	700
Biological [3]												
grazing	0	100	0	0	0	100	0	200	0	0	0	200
insects	100	80	20,000	1,400	10	21,590	100	120	20,000	1,400	10	21,630
pathogens [4]	0	5	0	0	0	5	0	10	0	0	0	10
Totals	8,095	5,900	26,890	1,839	1,290	44,014	7,350	3,895	26,890	1,599	1,240	40,974

[1] Idaho treated an average of 2,204 acres/year from 1978 to 1983.

[2] Montana treated an average of 1,438 acres/year from 1981 to 1984.

[3] Acres may increase as additional biological agents become available for release.

[4] Use of pathogens would be attempted in a cooperative experimental effort.

Alternative 3 (No Herbicide Use)						Alternative 4 (No Action)					
ID	MT	OR	WA	WY	Total	ID	MT	OR	WA	WY	Total
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
100	100	100	100	0	400	0	0	0	0	0	0
800	800	1,000	80	1,000	3,680	0	0	0	0	0	0
0	100	50	100	0	250	0	0	0	0	0	0
0	95	800	0	155	1,050	0	0	0	0	0	0
300	300	300	0	10	910	0	0	0	0	0	0
0	300	0	0	0	300	0	0	0	0	0	0
100	120	20,000	1,400	10	21,630	0	0	0	0	0	0
0	20	0	0	0	20	0	0	0	0	0	0
1,300	1,835	22,250	1,680	1,175	28,240	0	0	0	0	0	0

Appendix H-2.
Estimated Annual Acres of Chemical Treatment by Method, Herbicide Use, Alternative, and State

Herbicide	Major Trade Name	Maximum Rate of Application [1]	Idaho: Alternative 1 (Proposed Action) A	V	H	Idaho: Alternative 2 (No Aerial Herbicide Application) A	V	H	ESTIMATED Montana: Alternative 1 (Proposed Action) A	V	H	ESTIMATED Montana: Alternative 2 (No Aerial Herbicide Application) A	V	H
2,4-D amine salt or butyl ester		3 lbs. ai/acre	0	260	0	0	360	0	600	300	35	0	300	35
dicamba	Banvel	6 lbs. ai/acre	0	200	20	0	200	20	0	0	0	0	0	0
picloram	Tordon 22K	1 lb. ai/acre	780	300	50	0	400	55	0	650	125	0	800	240
picloram	Tordon 2K	1 lb. ai/acre	0	0	75	0	0	75	2,600	650	30	0	750	70
2,4-D & dicamba		2 lbs. ai/acre 2,4-D 1 1/2 lb. ai/acre Banvel	1,220	4,530	350	0	4,830	1,095	0	375	35	0	375	85
2,4-D & picloram		1 lb. ai/acre 2,4-D 1/2 lb. ai/acre Tordon	0	0	0	0	0	0	0	425	70	0	575	115
Glyphosate	Roundup	3 lbs. ai/acre	0	0	5	0	0	5	0	0	5	0	0	5
Totals			2,000	5,290	500	0	5,790	1,250	3,200	2,100	300	0	2,800	550

[1] These are the largest application rates that would be used. Actual application rates may be smaller.

A = aerial application by helicopter
V = ground vehicle application
H = ground hand application
ai = active ingredient

ANNUAL						ACREAGE											
Oregon						Washington						Wyoming					
Alternative 1 (Proposed Action)			Alternative 2 (No Aerial Herbicide Application)			Alternative 1 (Proposed Action)			Alternative 2 (No Aerial Herbicide Application)			Alternative 1 (Proposed Action)			Alternative 2 (No Aerial Herbicide Application)		
A	V	H	A	V	H	A	V	H	A	V	H	A	V	H	A	V	H
0	700	60	0	700	60	50	5	2	0	20	25	0	50	100	0	50	25
0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0
0	1,100	65	0	1,100	65	50	5	2	0	20	50	100	261	100	0	411	25
0	1,200	60	0	1,200	60	0	0	0	0	0	0	200	0	150	0	0	250
0	2,400	158	0	2,400	158	300	5	0	0	20	29	0	125	139	0	100	364
0	265	10	0	265	10	0	0	0	0	0	0	0	4	0	0	4	0
0	100	30	0	100	30	0	5	1	0	20	1	0	0	1	0	0	1
0	5,765	383	0	5,765	383	400	20	5	0	80	105	300	490	490	0	565	665

Appendix I
Project Design Features

Pretreatment Surveys

Documentation of the following information is required as a minimum when conducting pretreatment weed management field surveys.

1. Management program/objective for the site.

2. Consideration of all feasible vegetation management alternatives.

a) Identification of environmental effects of each alternative--fish, wildlife, soil, water, air, rare/endangered plants and animals.

b) human safety associated with each method.

c) Effectiveness of each method (retreatment needs).

d) Cost of each method.

e) Specificity of each method--hazard to nontarget species.

f) Map of survey unit(s).

3. Recommended treatment methods (combinations).

4. If chemical pesticides are recommended, the following additional information is required.

a) Herbicide, application rate, carrier.

b) Posting requirements.

c) Positive placement techniques planned to minimize drift and effects on nontarget areas.

d) Method of application.

e) Special restrictions on the herbicide label concerning handling, buffer strips, grazing, planting, wind speed, and droplet size.

f) Monitoring needs (water).

g) Timing of herbicide applications to avoid nesting, spawning, and calving/fawning period, or other sensitive periods in the life histories of species of high interest or critical concern.

Buffer Strips

Minimum buffer strips will meet or exceed state-mandated protected buffer strips for all herbicides applied next to live streams, lakes, or ponds. Wider buffer strips will be applied if a requirement is stated on the herbicide label.

Aerial applications require that a 500-foot unsprayed buffer strip be left next to inhabited dwellings unless waived in writing by the resident. A buffer strip of at least 100 feet will be left next to cropland and barns.

Application Contract Requirements

Most of the herbicides used in the EIS area are applied by contractors, who normally both supply and apply the chemicals. Often the contractor is the state or county weed district.

1. Contracts for applying herbicides will require that the water intake system for mixing be arranged so that an air gap or reservoir will be placed between the live water intake and the mixing tank to prevent any backflow of chemical into the water source.

2. Contracts for application will require that contractors not wash out spray tanks in or near streams or dispose of chemical containers on the contract area. Chemical containers should be disposed of at sites approved by the state departments of environmental quality.

3. During aerial spraying, spray will be turned off at the end of spray runs and while the aircraft is turning to start another run. Initial spray swaths along buffer strips or areas to be protected will be made parallel to these areas and before the rest of the project is sprayed.

4. Herbicides will be mixed and loaded in an area where an accidental spill cannot flow into a stream or water body, or contaminate groundwater.

5. Herbicides will not be applied to asphalt or other types of paved roads.

6. Aerial application equipment will not be equipped with drip nozzles that use a vacuum or syphon automatic shutoff system that will draw the chemical back from the boom when not spraying. Spray nozzles on the boom will not be extended horizontally on the boom to more than 6/7 of the length of the helicopter rotor.

7. In aerial applications, the contractor will provide at least one qualified person for each mixing truck to handle fueling, mixing spray solutions, and loading. The contractor will also provide a foreman for each heliport to supervise operations. The foreman will be equipped and trained to take remedial action for equipment malfunctions or spills of herbicide or herbicide carrier mixes.

8. To reduce drift and volatilization (see Glossary), aerial spraying will be prohibited when any of the following conditions exist on the spray area: wind velocity exceeds 5 miles per hour; rain or expected rain reduces or will reduce the effectiveness of the chemical being applied; fog obscures the visibility of the target area; air turbulence (thermal updrafts) is so great as to seriously affect the normal spray pattern; or temperature inversions could lead to offsite movement of the spray.

Label directions will be followed instead of the above restrictions if the directions prescribe different conditions of use. Low volatile formulations of phenoxy herbicides will be used to reduce the potential for off-site contamination.

9. During application weather conditions will be measured hourly by trained personnel at spray sites. More measurements will be taken whenever a weather change appear to have the potential to jeopardize safe placement of the spray on the target area.

10. Helicopters will normally be required to fly at an air speed of 40 to 50 miles per hour at a safe distance above the vegetation. Spray pressure in the boom will normally be 20 to 35 pounds per square inch. Maximum drift reduction techniques will be used with normal spray formulations and application equipment.

Herbicide labels may specify boom pressures, air speeds, aircraft heights, and nozzle configurations desirable to reduce drift and increase effectiveness. In the event of a conflict, the label specifications will be followed instead of the above requirements.

11. During air operations, a radio network will be maintained to link all parts of the project, and direct radio communications will be established between spray aircraft and ground crews.

12. On herbicide application projects conducted directly by BLM personnel, a licensed (certified) employee will monitor and supervise the project. Contractors will be licensed according to state and federal law. A BLM project inspector will ensure compliance with contract requirements.

13. Buffer strips (or no-spray areas) will be determined by local BLM offices in the individual states. Buffer strips may also be designated by the contracting officer's authorized representative (COAR) or the project inspector during operations as a means to protect undetected rare plants, critical riparian zones, and other sensitive areas.

14. No more than one application of picloram will be made on a given site in any given year to reduce the potential for picloram accumulation in the soil.

Water Monitoring and Studies

To determine the effectiveness of buffer strips and administrative controls in reducing impacts on water quality and the aquatic environment, BLM will monitor water quality as appropriate to the actions implemented. Each district will evaluate its monitoring needs. When an annual spray program is developed, each district will determine the location of Class I streams and areas that might require special attention, such as domestic water supplies and fish hatcheries. The district will then use this information in establishing priority sampling areas. When reviewing the locations of planned herbicide treatments, the district specialist responsible for water quality monitoring will select sites for water quality sampling.

Monitoring schedules will be designed to allow sampling when concentrations are most detectable. In addition, contingency plans will be developed to permit sampling during any phase of the treatment program should a situation arise that requires a quick reaction. Control samples will be taken before treatment, ideally within 24 hours of the treatment period. The sample should be taken from the same site as the other monitoring samples.

Any stream may be considered for water quality sampling, but all waters need not be sampled. To aid in selecting streams for monitoring, a priority system has been developed to give highest priority to streams with important fisheries, extensive human use, or a potential for major environmental impacts. The following are priorities for which monitoring is considered.

1. Municipal watersheds
2. Fish hatchery supply watersheds
3. Domestic and agricultural watersheds
4. Major fish-bearing streams
5. Unique situations

Monitoring should also be considered in the following other situations.

1. The stream is not classified as a Class I stream but contains an important population of resident fish.

2. The stream flows into a marsh or lake within 5 miles downstream from the treatment area. Herbicide dissipates gradually in flowing water but accumulates in quiet areas such as lakes or marshes. In the lakes or marshes, the herbicide can kill or injure rooted or planktonic plants.

3. Thirty percent or more of a watershed is being treated in 1 year, especially during winter and spring when many small ephemeral and intermittent streams are flowing. Any herbicide entering a small stream will be quickly diluted when the stream merges with other streams. But if several areas in a watershed are treated, the dilution effect may be lost. In watersheds with extensive herbicide treatment where the dilution effect may be reduced, sampling should be considered, at least on the larger streams downstream from the treatment area.

4. The watershed is considered to be socially sensitive. Public interest is often much greater in some areas than others. Those areas for which the public has expressed the most interest should be considered for water quality monitoring.

READEX FICHE

Appendix J Analysis of Program Costs

Program costs were analyzed to provide a monetary basis for comparing the alternatives.

In response to a report by the U.S. General Accounting Office (U.S. GAO 1981), BLM has recorded detailed project cost data on vegetation management activities. These cost data are the primary sources of current BLM costs in this EIS. The average annual costs presented below include costs of chemicals, labor, equipment, and administration for the five-state EIS area. Costs associated with EIS preparation, litigation, accidents, and training are not included.

The ranges of actual treatment costs per acre are summarized below. The ranges reflect differences in application rates.

The costs for Alternative 1 were determined by identifying the most effective methods of treatment to control weeds on the number of infested acres on BLM lands in each state. The costs for Alternatives 2 and 3 were limited to the level needed to fund Alternative 1. Some of the most cost-effective methods (aerial application of herbicides), would not be applied under either Alternative 2 or 3, and thus fewer acres of infested land could be treated.

Individual Treatment Costs Per Acre

Chemical	Helicopter ($)	Boom Spray ($)	Handgun ($)	Backpack ($)
Tordon 22K	20-29	28-37	70-79	120-129
Banvel + 2,4-D	28	36	78	128
2,4-D	20	26	70	120
Banvel	52	30	102	152
Roundup	90	98	140	190
Tordon 2K	25-39	33-47	75-89	125-139
Tordon 22K + 2,4-D	31	39	81	131

Treatment	($)
Manual	
Hand tools	235
Hand pulling	235
Mechanical	
Burning	9
Mowing	54
Tilling	114
Biological	
Grazing	10
Insects[1]	15
Pathogens	15

[1] In Oregon the cost is estimated to be $3 per acre.

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Chemical Hazard Assessment

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Common Name: Dicamba

Chemical Name: 3,6-dichloro-o-anisic acid

Major Trade Names: Banvel

Major Applications in Noxious Weed Control: Dicamba is used to control or cause growth suppression of many annual, biennial, and perennial broadleaf weeds in pasture, rangeland, and noncropland areas.

Summary

Dicamba degrades best in soils with high organic matter and high moisture contents and at higher temperatures. Degradation mainly results from microbial action. Under field conditions, dicamba will probably not persist more than several months in most soils. The products of dicamba degradation in soil are 3,6-dichlorosalicyclic acid and carbon dioxide.

Dicamba has been shown to volatilize from soil and leaf surfaces, but the extent and significance of losses due to volatilization have not been determined. Dicamba is considered a highly mobile herbicide. The dimethylamine salt is extremely water soluble. Studies have shown that salts of dicamba readily leach in soil and that dicamba only slightly adsorbs onto most soil types. Photodecomposition is probably not a major route of degradation.

Few studies, however, have been conducted on the fate and persistence of dicamba in water. Model ecosystem studies show that, in water, dicamba and its metabolites persist in conjugated or anionic forms. Dicamba slowly transforms to 5-OH dicamba in water (about 10 percent after 32 days) and is slowly decarboxylated.

Dicamba is phytotoxic to a variety of plants, including conifers. Plant susceptibility depends on differences in the distribution of dicamba within a plant and differences in the rate of adsorption, translocation, and metabolism. Dicamba has a low level of acute toxicity to mammals and birds. The oral LD_{50} of technical Banvel to rats is 1,707-2,900 milligrams per kilogram (mg/kg) and to mallard ducks is 2,009 mg/kg. Dicamba is more toxic to fish; the 96-hour LD_{50} is 135 milligrams per liter (mg/1) for bluegills and rainbow trout. Dicamba has been shown to be relatively nontoxic to bees. It does not bioaccumulate.

The following source documents present detailed information on the fate and behavior of dicamba in the environment and potential impacts: Ghassemi and others 1981; USDA, FS 1984; and DOE, BPA 1983. In accordance with 40 CFR 1502.21, these source documents are incorporated into this EIS by reference. The following discussions on toxicity and hazard assessment were extracted from "Pesticide Background Statements," USDA, FS (1984) and pages 29-31 of the report "An Analysis of Human Health Hazards Associated with Some Herbicides Used in Forestry," prepared for BLM by Dr. Frank N. Dost (1983).

Toxicity

The chronic toxicity of dicamba has been evaluated in rats, dogs, and mice that received dicamba in their diets for periods up to 2 years. The highest dose induced increased mortality and organ weight changes in mice. Continuous feeding of rats with 5, 50, 100, 250, and 500 parts per million (ppm) dicamba for 2 years elicited no adverse effects. Survival, body weight, food consumption, organ weight, hematology, and histology of viscera were normal (Weed Science Society of America 1983). In another chronic study, mice were fed dicamba at concentrations of 100, 1,000, and 10,000 ppm. At 10,000 ppm, decreased body weight and increased liver weight were observed. All high dose mice were sacrificed after 14 months of feeding. The medium- and low-dose groups were sacrificed 19.5 months after continuous dicamba feeding. Enlargement of liver cells was the only dose-dependent effect noted, but whether this effect is reversible was not determined (DOE, BPA 1983).

Reproductive and teratogenic effects of dicamba have not been observed in several rat studies, but teratogenic effects have been observed in rabbits at high doses. Rats fed 500 ppm dicamba for 3 to 4 months showed no change in reproductive capacity in either parents or offspring and produced no evidence of teratogenic effects over a three-generation study (Velsicol 1971 in USDA, FS 1984). No reproductive effects were observed, and no changes in fertility, gestation, viability, or lactation were observed over three generations.

In rabbits, a differential response to technical dicamba levels at 1, 3, 10, and 20 mg/kg/day given on days 6 through 18 of gestation has been reported. At 10 and 20 mg/kg/day, post-implantation losses and a decreased number of live fetuses were observed. With 3 mg/kg/day, there were no effects (DOE, BPA 1983).

Dicamba has been tested for mutagenicity and for its effect on unscheduled DNA synthesis. The results were negative for Salmonella typhimurium (Poole and others 1977; Eisenbeis and others 1981; Anderson and others 1972); Escherichia coli (Poole and others 1977); and Saccharomyces cerevisiae (Poole and others 1977). Unscheduled DNA synthesis was assayed in human fibroblast line WI-38 and was negative for dicamba (Poole and others 1977). Dicamba was positive in relative toxicity assays in E. coli (Poole and others 1977). Dicamba has been negative in in vitro test systems, except those measuring relative toxicity. On the basis of these results, dicamba is not considered to be mutagenic.

Chronic dicamba feeding studies discussed above have showed no carcinogenicity in rats, beagle dogs, and mice. Dicamba was administered for 2 years in the diet of dogs at 5 to 50 ppm in the diet of rats at 5 to 500 ppm. The tumor incidence and time until appearance of the first tumor were the same in untreated controls and in groups of rats and dogs fed dicamba for 2 years (Weed Science Society of America 1983). Mice were administered 10,000 ppm dicamba in the diet for 14 months and 100 or 1,000 ppm dicamba in the diet for 19.5 months. No evidence for dicamba-induced carcinogenicity was found in mice sacrificed either at 14 or 19.5 months (DOE, BPA 1983).

A difference of 7,500-fold exists between the reproductive no-effect level and that intake, which represents no hazard.

Hazard Assessment

The typical use rate of dicamba is about 1 pound active ingredient/acre. Occupational exposure may occur in handling of the concentrated material, which is provided as about 4 pounds of the dimethylamine salt per gallon of water.

The extensive data obtained from studies of 2,4-D exposure directly apply to dicamba, and the maximum daily intake by applicators will not exceed 0.1 mg/kg. No data exist on absorption through skin by dicamba, but dermal toxicity data suggest that transport across skin is less than that for 2,4-D. As a conservative estimate, the data that apply to 2,4-D will be used as a guide.

A somewhat higher probability may exist of environmental contact with dicamba than with some other herbicides because dicamba does not bind as tenaciously to organic and inorganic matter as do most other agents. Dicamba has a greater mobility in soil than most other herbicides, but not to the extent that it has a significant tendency to migrate from use sites.

Dicamba applied next to a stream has a somewhat greater tendency than other herbicides to wash in with the first rain after application because of the limited binding. Norris and Montgomery (1975) studied a watershed in western Oregon treated with dicamba-2,4-D. This treatment area was next to and at some points crossed small tributaries of a creek that discharged from the area at 57 liters/second. A 1-pound/acre treatment resulted in a peak concentration at the feeder outlet of under 40 ppb, about 5 hours after application, without buffering the small tributaries. The stream into which the feeder discharged peaked at 10 ppb shortly thereafter, and at the end of 1 day the herbicide could no longer be detected. Under current practices, even that level is unlikely to be reached at any point in the system. If helicopter applications are used, the provision of buffer strips as described in Appendix I should reduce the potential for dicamba drift into water bodies. But an assumption of a single-day peak of 10 ppb may be accepted for hazard assessment purposes. A 2-liter water consumption by a person weighing 50 kg would result in a dose of 0.0012 mg/kg. Dicamba concentrates in fish to a level which is 1/8 to 1/10 less than that of the surrounding water (Yu and others 1975).

Present evidence reveals no mutagenic or carcinogenic potential of dicamba, and an assessment of such risks is not needed.

If a no observed effect level (NOEL) of 3 mg/kg for reproductive effects is accepted, female applicators should be restricted from working with dicamba. Other general effects occurred only at high doses and represent little hazard to applicators.

Common Name: 2,4-D

Chemical Name: 2,4-dichlorophenoxyacetic acid

Major Trade Names: Weedone LV-6; Esteron 99 Concentrate; Weedar 64; Formula 40

Major Applications in Noxious Weed Control: 2,4-D is used as a selective annual and perennial broadleaf weedkiller in grass pastures, rangelands, and noncropland areas.

Summary

Plants readily absorb, translocate, and metabolize 2,4-D. The formulation influences the degree of absorption. Once absorbed, 2,4-D may be chemically altered by a variety of mechanisms. Residues at phytotoxic levels are believed not to persist in dead vegetation.

2,4-D is considered a relatively nonpersistent herbicide. The 2,4-D acid is degraded mainly by micro-organisms. Esters and amines of 2,4-D hydrolyze to acid form within a few days after deposition in the soil. In warm, moist soils with a high organic content, 2,4-D can degrade within days, but 2,4-D can persist for many months in the absence of favorable soil conditions. Leaching of 2,4-D is more extensive in soils with less organic matter and a lower pH. Leaching and adsorption are inversely related. 2,4-D generally remains within the top foot of the soil profile.

In water, esters of 2,4-D are also rapidly hydrolyzed to the acid form. The persistence of the acid depends on the presence of microorganisms adapted to 2,4-D degradation. In cool, nutrient-poor, natural surface waters, 2,4-D may remain stable for many months. Photodecomposition has been shown in the laboratory, but the degree of 2,4-D degradation in the field with natural sunlight is unknown. Volatilization is usually not a major mechanism for removal of 2,4-D from water.

2,4-D is phytotoxic to many nontarget plants, including some crops and ornamentals. The toxicity of 2,4-D to fish highly varies, depending on the species, water quality, and 2,4-D formulation. The acute oral LD 50of 2,4-D for some birds ranges from 300 to 5,000 mg/kg. 2,4-D is generally less toxic to birds than to mammals. The toxicity of 2,4-D to honey bees is low. 2,4-D does not tend to bioaccumulate in fish or in mammals. Carcinogenicity was not detected at test dosages. Teratogenic effects were detected at dosage levels ranging from 20 mg/kg/day up to near acute lethal dosages. Mutagenicity studies have resulted in conflicting data.

EPA (1980) recently reviewed all research and concluded that 2,4-D does not pose an imminent hazard and would not cause an unreasonable adverse effect when used according to label precautions.

Detailed information, summarized above, concerning the fate and behavior of 2,4-D in the environment and potential impacts may be found in the following source documents: Ghassemi and others 1981; USDA, FS 1984; and DOE, BPA 1983. In accordance with 40 CFR 1502.21, these documents are incorporated into this EIS by reference. The following discussions on toxicity and hazard assessment were extracted from pages 11-16 of the report 'An Analysis of Human Health Hazards Associated with Some Herbicides Used in Forestry,' prepared for BLM by Dr. Frank N. Dost (1983).

Toxicity

The toxicological behavior of 2,4-D raises concern in three general areas: (1) 2,4-D is known to be a teratogen at high doses; it is known to cause musculoneural injury in humans and in experimental animals at high doses; (2) it is a weak mutagen; and (3) Data that indicate that 2,4-D is noncarcinogenic are not adequate to support full confidence that it in fact is not a carcinogen. The reproductive and myoneural effects can be dealt with on a dose-response basis because the dosages required to cause such effects, where they can be caused, are known at least qualitatively. 2,4-D has been found to have weak mutagenic activity in some of the many assays to which it has been subjected, but such information is easily misunderstood by the public, which generally cannot analyze the significance of such findings. The allegation of carcinogenicity is based not on the existence of data but on the absence of data. The research on carcinogenicity of 2,4-D has been deficient, and though the data is negative, it is not absolutely reliable for a scientific conclusion or a proper basis for concluding that 2,4-D is carcinogenic.

2,4-D has been studied intensively as a potential reproductive intoxicant. Like virtually every chemical, it can cause fetal toxicity if the dose is raised high enough, just as it and every chemical can intoxicate an adult animal. 2,4-D is a teratogen in some species, not in others. A teratogen is a chemical that, when given during the period of gestation when organs and limbs are beginning to form, can cause derangement and abnormal structural development or birth defects. Teratologists generally recognize this kind of effect as being subject to a threshold, a dose below which no effect will occur.

Like many chemicals, 2,4-D can cause such more subtle reproductive effects as decreased birth weights and decreased litter size and fertility. Most of these changes occur at doses in the range where the adult animal is visibly affected. The dosage at which no change occurs has been variously determined at 25-35 mg/kg/day. We use 20 mg/kg/day as a conservative figure.

Poorly known is the precise dosage for the onset of myotonia or the corresponding peripheral neuropathy observed in a few humans. Myotonia has apparently occurred only after heavy exposure to the concentrated herbicide, although in two or three cases sustained heavy exposure to diluted material may have occurred and some neurological effect was seen. Some cases of exposure, including one almost successful suicide attempt, have generated no such symptoms.

In animals doses of 150-300 mg/kg are required to cause significant general toxicity. Myotonia in experimental animals appears to be similar to that which has been observed in humans.

The meaning of a limited mutagenic activity has not been translated into any kind of regulatory response procedure by responsible agencies. Scores of common chemicals have some kind of activity in short-term genetic toxicity screens. Conclusions as to significant mutagenicity derive from the total experimental base, including reproduceability, potency, ability of the chemical to reach germinal tissues, and activity in *in vitro* tests. 2,4-D has been found to have activity in relatively few tests of *in vitro* genetic activity, almost all at high concentrations, and has been found to have no activity in many more tests than have been positive. The consensus among regulatory and other toxicologists is that the limited mutagenic activity does not represent a mutational hazard at amounts found either in the workplace or the general environment. A reasonable quantitative relationship cannot be drawn between such tests and the environmental exposures that are discussed.

The existing carcinogenesis data, the weak mutagenicity, the manner of excretion, and the harmless nature of the contaminants of 2,4-D do not suggest that this chemical should not be carcinogenic, but BLM must await new data being generated for a final conclusion.

Hazard Assessment

Almost all data from measurements of occupational exposure has been generated in studies of 2,4-D and 2,4,5-T applications. The most heavily exposed workers, mixer-loaders for aircraft applicators and backpack sprayers, may expect maximum doses of about 0.1 mg/kg.

The exposure of a person standing at the downwind edge of the buffer zone would be 0.1 mg/ft of uncovered surface. At 4 pounds/acre and 2 ft of surface accessible, a contacted dose may be as much as 0.08 mg or 0.0016 mg/kg. Respiratory exposure is not significant. The same deposition rate in a stream 6 inches deep could result in a theoretical concentration of about 30 ppb. Two liters would contain 50 micrograms or 1.2 micrograms/kg (0.0012 mg/kg) or a 50 kg person. Deeper water would lower the dose accordingly. The known rapid adsorption of chemical to water sediment is not considered.

Much data exists on fish uptake of 2,4-D. Generally, levels of 2,4-D in edible tissues are lower than the ambient water concentrations. Eligehausen and others (1980) maintained catfish for 4 days at about 0.01 ppm 2,4-D and found that the concentration of 2,4-D in whole fish rose to a level of 0.004 ppm over the 4-day period. At 2 days this concentrations was only 0.0025 ppm. The concentration faster was 0.4.

Sikka and others (1977) similarly found that in water containing 2 ppm 2,4-D dimethylamine salt, bluegills accumulated 0.071 ppm in edible tissue in 6 hours, and catfish accumulated 0.17 ppm. In both cases, tissue levels remained relatively constant through 168 hours of continuous exposure. The concentration factors were about 0.04 for the bluegill and 0.1 for the catfish.

Rogers and Stalling (1972) maintained trout, bluegill, and catfish in 0.3 and 1.0 ppm 2,4-D butoxyethanol ester in both fasted and fed states. Muscle residues ranged from three to six times water concentration in trout at 3 hours. In catfish the concentration factors were as high as 15 and in bluegill about 5-7 at 1 hour after exposure began. After 2 hours, the concentrations rapidly decreased. This ester of 2,4-D is relatively fat soluble, and though it hydrolyses to 2,4-D relatively quickly, it survives long enough to accumulate briefly.

The treatments of concern here are with water soluble forms. If a concentration factor of 1 is assumed, 0.5 kg of fish would contain 15 micrograms 2,4-D, which would provide a dose of 0.0003 mg/kg.

Game that had browsed on treated foliage might reach tissue concentrations of 0.4 ppm. A half kilogram of such meat would deliver a dose rate of about 0.004 mg/kg.

Residues on berries and mushrooms just outside the target zone should not exceed 0.1 ppm after aerial application, which would result in a maximum daily dosage of 0.5 micrograms (0.0005 mg)/kg/day from consuming 0.25 kg/day of berries or mushrooms.

Ground application to within 10 feet of boundaries should not contaminate offsite vegetation.

A minimum safety factor for maximum exposure to applicators would be based on the reproductive no observed effect level (NOEL) of 20 mg/kg/day. The maximum dose of 0.1 mg/kg would be 0.005 of the NOEL dose.

The maximum environmental exposure resulting from offsite contamination could result from consuming 0.5 mg of deer meat. The prospective dose would be 0.004 mg/kg/day which is 5,000 times less than the reproductive NOEL dose.

Because of the weak mutagenic effect, the absence of data to support a conclusion that 2,4-D is not carcinogenic, and the controversy surrounding the use of this chemical, an assessment of cancer risks is needed.

2,4-D Contaminants

In the case of 2,4-D, special attention must be paid to two contaminants, one of which is also a metabolic product in microorganisms. The issue arises not because of data indicating hazard but because of allegations based on incorrect evaluation of the data.

In the manufacture of 2,4-D, 2-4-dichlorophenol (2,4-DCP) is an intermediate, some of which may remain in the final product. Because of its low toxicity, 2,4-DCP has not been judged toxic enough to be eliminated from the formulation. Boutwell and Bosch (1958) reported on a study of the cancer-promoting potential of phenol and many substituted phenols, among them, 2,4-DCP. At doses large enough to cause substantial mortality from direct toxicity, 2,4-DCP was found to be a weak promoter of skin tumors initiated by a highly potent complete carcinogen. In direct contradiction to the interpretation of the authors, however, that finding has been converted into an allegation that 2,4-DCP is a highly efficient promoter.

Some also contend that large amounts of 2,4-DCP resulting from breakdown of 2,4-D remain in the environment and are immediately accessible to humans and other species. 2,4-DCP is the immediate microbial breakdown product of 2,4-D, and is in turn further oxidized by the same organisms. The rate function for each of the steps in this long series of oxidations is higher than the preceding step. Breakdown thus becomes easier with each step. The products are mostly not liberated but remain captive in the microorganisms. 2,4-DCP is so volatile that if it were to escape it would immediately dissipate. It also has an exceedingly low olfactory threshold: extremely small amounts are detectable by smell. The result of these factors is that only applicators or others working directly with the material before it is applied have any significant opportunity for contact. At worst, such immediate contact is something less than 0.3 percent of the corresponding exposure to 2,4-D.

The eight manufacturers of 2,4-D in the United States have subjected their products to analysis for 2,4-DCP. Total chlorophenols, of which 2,4-DCP is predominant, were about 0.3 percent in the most contaminated sample. Many contained no detectable chlorophenols. Other chlorophenols include 2,6-DCP and the 2-chloro-and 4-chlorophenols, all of which are minor contributors. (Warren 1983) If a figure must be assigned, occupational exposure may be estimated in the worst case at about 0.0003 mg/kg.

Environmental exposure will not correspond to the amount of 2,4-D applied, either as a fixed fraction of impurity or as a fraction of applied and degraded 2,4-D. As an impurity, 2,4-DCP has a high vapor pressure, so it evaporates and disappears quickly. As a metabolite of soil organisms, 2,4-D is almost entirely entrained in those organisms, although at high levels of 2,4-D in water some DCP can be found. Environmental exposure to 2,4-DCP is so low that it cannot be measured.

The toxicity of 2,4-DCP is extremely low. Chronic (6 months) treatment of mice, at 0.1 percent (1,000 ppm) of the total diet, produced no effects other than a slight liver enlargement (Kobayashi and others 1972). The lethal dose is on the order of 10 times greater than that of 2,4-D.

The skin tumor promotion study by Boutwell and Bosch (1958) used a twice-weekly application of 20 percent 2,4-DCP in benzene as solvent to an area already treated with a potent carcinogen. The individual dosage of 2,4-DCP was 5 mg/mouse twice weekly. The dose at each application was about 200 mg 2,4-DCP/kg at each treatment. This amount is not an excessive relative to the acute toxicity (LD 50) of 2,4-DCP, which in mice is about 1,300 mg/kg. Over the 30 weeks of twice weekly treatment, however, this dose resulted in the death of many animals. Carcinogenesis studies customarily set the maximum dosage at a level that produces no significant non-timorigenic pathology and causes no greater than 10 percent weight loss of the subjects. Because of the great skin damage and the mortality rate of the animals, the Boutwell-Bosch study does not qualify as a valid carcinogenesis study.

The important relationship is the amount of 2,4-D needed to carry that amount of 2,4-DCP. At a concentration of 0.3 percent, intake of 67,000 mg 2,4-D per kg twice weekly for 39 weeks would be needed to simulate the exposure. The worst-case applicator exposure is about 0.1 mg 2,4-D/kg, and the difference is so great that 2,4-DCP is not a calculable component of the 2,4-D hazard potential.

The other impurity is, 2,7-dichloro dibenzo-p-dioxin (DCDD), which differs only slightly in structure from the well known 2,3,7,8 TCDD, but differs by about a million fold in toxicity. Two concerns of biological danger have been expressed: DCDD is alleged to be a teratogen, and DCDD is alleged to be carcinogenic.

DCDD has been found in 3 of 30 samples of U.S.-produced 2,4-D, along with traces of other relatively nontoxic chlorodioxins with three and four chlorines. The concentrations in the three positive samples ranged from 25 to 60 ppb. If the maximum expected human dose of 2,4-D is 0.1 mg/kg, and for convenience all 2,4-D is assumed to contain 100 ppb of DCDD, the dose of DCDD to the exposed human would be 0.00000001 mg/kg.

The toxicologic studies from which these concerns arise are reported by Khera and Ruddick (1973), who discussed fetotoxic effects of DCDD, and the National Cancer Institute (1979), which conducted carcinogenesis studies in two species. Khera and Ruddick fed DCDD at dosages of 1 and 2 mg/kg daily to determine whether DCDD could cause birth defects. The observed effect at 1 mg/kg was a modest degeneration of heart muscle fibers and some fluid accumulation around the heart in a few of the animals. A somewhat greater number of animals were affected at 2 mg/kg. Both effects are in the category of general fetal toxicity. No teratogenic effect was found.

The National Cancer Institute (1979) work was carried out by feeding DCDD as 0.5 and 1 percent of the total diet for 2 years. The data indicated a 'suggested' carcinogenic effect in male mice that was not strong enough to support a conclusion that DCDD is a carcinogen. Male mice and rats of both sexes did not significantly respond.

These observations may be considered as actual 2,4-D exposure or as the amount of 2,4-D needed to deliver the DCDD used in the studies.

The 1 mg/kg dose of DCDD used by Khera and Ruddick (1973) is 100 million times greater than the dose that would accompany a 0.1 mg/kg dose of 2,4-D. If 1 mg of DCDD/kg were delivered in 2,4-D at 100 ppb, the needed dose of 2,4-D would be on the order of 10 kg/kg body weight, or for a 150 pound person, 3/4 ton of 2,4-D.

The 1 percent diet to mice delivered a still greater relative amount. A 25-gram mouse eats about 5 grams of feed daily. At 1 percent of the diet, consumption would amount to about 50 mg DCDD/mouse or 2,000 mg/kg daily for life--about 200 billion times more than the expected maximum occupational exposure. At 100 ppb contamination level, the 2,4-D intake required to deliver this amount would be 20,000 kg (20 metric tons) 2,4-D/kg. For a 50 kg person this amount greatly exceeds the national capacity to manufacture the herbicide.

The conclusion, therefore is that neither 2,4-DCP nor 2,7-DCDD, at maximum occupational or environmental exposures to 2,4-D, represents a human hazard.

Common Name: Picloram

Chemical Name: 4-amino 3,5,6-trichloropicolinic acid

Major Trade Names: Tordon, Amdon

Major Applications in Noxious Weed Control: Picloram is used for the control of broadleaf weeds on rangeland and permanent grass pastures.

Summary

Most information on the fate of picloram in soil and water is the result of laboratory and field studies with agricultural systems.

Picloram is rapidly absorbed by plant roots and less rapidly by foliage. Once absorbed, it is readily translocated throughout the plant and tends to accumulate in new growth. It is highly stable and remains largely intact within the plant.

Picloram is considered moderately to highly persistent in soils under conditions of normal application and may exist at phytotoxic levels for over 1 year. Reported half-lives vary from 1 month to over 13 months. Persistence is generally shorter in soils with high organic matter and adequate moisture such as in forest soils and in warm temperatures. Picloram degrades in soil via microbial rather than chemical routes, but amounts of picloram decomposed are small. Picloram photodecomposes on soil surfaces to the greatest extent under intense sunlight.

Picloram is considered a mobile herbicide and is reversibly adsorbed on soil particles. Adsorption is greatest in soils high in organic matter and increases with decreasing pH, particularly in clay soils. Leaching occurs to the greatest extent in sandy, light-textured soils and in soils poor in organic matter. Because of the water solubility of picloram and its salts and its leaching tendencies, runoff from treated areas can contain relatively high concentrations of picloram.

Picloram is phytotoxic to many nontarget plants and is highly toxic to young pine seedlings. Several incidents of damage to nontarget plants from picloram spray drift have been reported. Certain plant species have been injured as long as 5 years after application because of picloram's persistence.

Picloram and its salts are low in toxicity to fish and other aquatic organisms. Picloram also has low toxicity to warm-blooded animals, soil microorganisms, and bees and is rapidly excreted by and does not bioaccumulate in mammals. Picloram in water is not accumulated in invertebrates or in food chains.

New carcinogenicity studies are being conducted. Mutagenicity and teratogenicity has not been detected at test dosages.

The following source documents present detailed information on the fate and behavior of picloram in the environment and potential impacts: Ghassemi and others 1981; USDA, FS 1984; and DOE, BPA 1983. In accordance with 40 CFR 1502.21, these documents are incorporated into this EIS by reference. The following discussions on toxicity and hazard assessment were extracted from pages 16-19 of the report "An Analysis of Human Health Hazards Associated with Some Herbicides Used in Forestry," prepared for BLM by Dr. Frank N. Dost (1983).

Toxicity

The toxicology of picloram has been described in part in the open literature and in part in data submitted for registration of the compound and still held proprietary. Nonetheless, an adequate description of the biological effects of picloram is accessible, and its hazard can be satisfactorily assessed.

Picloram's acute toxicity in mammals is less than that of 2,4-D by a factor of 10-15. If the dose is raised enough, a variety of nonspecific pathological changes can occur in the liver and kidneys, but the no observed effect level (NOEL) doses are quite high at about 80 mg/kg/day in rats. Dogs fed 150 mg/kg/day for 2 years were not affected.

A three-generation reproduction study of 4 male rats and 12 female rats given up to 150 mg picloram/kg in feed beginning 28 days before the first mating did not result in feed impairment of reproductive capacity associated with chemical treatment.

Teratogenic effect was absent in rats at doses up to 1,000 mg/kg/day given through the period of organ formation. The doses were high enough that several maternal deaths occurred at the upper levels. Even at such intake, no fetal wastage or postnatal effects occurred among survivors. Skeletal development was slowed at the highest dose. Picloram has produced no detectable mutations in in vitro tests.

Research has not found picloram to be carcinogenic. The early studies were not designed as carcinogenicity assays but rather were lifetime general toxicity evaluations in which observation of tumor formation was an incidental. At 120 mg/kg/day, no tumors were observed in rats. More recently, the National Cancer Institute (1978) carried out a study in rats and mice in which the animal work was contracted to a reputable private laboratory, but design and assessment were done jointly. Rats were maintained at average dietary concentrations of about 0.75 percent and 1.5 percent (7,437 ppm and 14,875 ppm) picloram in the diet for 80 weeks. The rats were then observed for 33 weeks and killed.

Mice were given a diet containing about 0.25 percent and 0.5 percent (2,531 ppm and 5,062 ppm) for 80 weeks and observed for 10 weeks. (These doses are about 500 and 1,000 mg/kg/day in the respective species. Lifespan is somewhat over 2 years for both species. Genetic toxicity such as cancer is generally assumed to occur in lifespan fractions for species rather than calendar time; events that require half a lifetime in humans probably require half a lifetime in rats.)

The observations of these studies showed a nonsignificant increase in thyroid tumors in rats but not in mice and a significant increase in benign liver tumors in female rats.

The conclusion of the pathologists and the review team was that picloram was not carcinogenic in mice or male rats and that picloram at high sustained doses could induce benign tumors in female rats.

The understanding of the hazards or lack of hazard associated with picloram is complicated in the public mind by a recent burst of allegations about increased cancer incidence in a North Carolina community and an association with picloram use. Although both the State of North Carolina and EPA have shown neither an increased cancer incidence nor detectable picloram entering the diet of the community, the story continues to be disseminated. EPA has seen fit to issue a bulletin to establish the facts of the issue.

That picloram is a restricted use chemical is incorrectly interpreted by some people as an indication of dangers to humans resulting from its use. Picloram is exceedingly toxic to crop plants, and a restricted label limits its use to licensed applicators who presumably can protect nontarget crops.

The public understanding of the carcinogenic risk associated with picloram has also been complicated by allegations made by a pathologist, until recently associated with the National Cancer Institute (NCI), that the evaluations of tissue pathology in the NCI studies were incorrect and that the statistical treatment of the data was also faulty. A variety of circumstances have led the scientific community to be highly skeptical of these allegations.

The data does not support a contention of carcinogenicity, but an open and valid scientific question exists about the meaning of the nodules or benign tumors of the liver. These changes are generally considered not to represent a malignant process because they tend to diminish with time after treatment stops. A body of opinion, however, considers these changes as a precancerous development that if sustained will become malignant.

Hazard Assessment

Picloram is a pyridine derivative herbicide used for roadside maintenance, site preparation, and injection into larger trees that must be removed. Its environmental behavior differs from most other herbicides in that (1) it is highly mobile in plants and can move into plants through the root system, and (2) as the plant metabolism becomes depressed by the action of the herbicide, it may move back to the roots, into the soil, and onto other plants. Picloram is used at much lower concentrations than other herbicides; when used with 2,4-D, the ratio 2,4-D/picloram is typically 4 to 1.

Occupational exposures to picloram take place during aerial and ground treatments. Environmental exposures from spray drift, surface contact, and consumption of biota follow the same principles that apply to other herbicides. The potential for picloram concentratrations in water is at least theoretically greater. Traces of picloram of unknown origin have been found in water supplies over an extended period. Picloram has increased mobility in the more mesic soils, where more water is moved through the soil profile. However, mobility is decreased as soil organic matter is increased.

Because of the smaller amounts used, the exposures by direct contact may be considered at most to be about half the amount expected in exposures to 2,4-D, and in many cases will be as low as a tenth of that amount. Backpack applicators and aircraft mixer-loaders should therefore be exposed to no more than 0.05 mg/kg.

A maximum application rate of 2 pounds/acre would deposit at most 0.2 mg/ft^2 at the downwind edge of the buffer zone. Two ft^2 of exposed body surface could result in a maximum exposure of 0.4 mg picloram. Assuming a 10 percent absorption would indicate a dose of 0.04 mg/50 kg body weight, or less than 0.001 mg/kg.

The concentrations in water as a result of direct drift from 2 pounds/acre at 100 feet, 500 feet, and a quarter mile would be at most 15 ppb, 0.75 ppb, and 0.15 ppb respectively, assuming a water depth of 6 inches, using the drift data alluded to in the section on phenoxy herbicides, and using the theoretical concentration, not the much lower data obtained in direct field measurements. Concentrations in water as a result of migration in soil will not approach the maximum already calculated as a function of drift. The dose to a 50 kg person daily consuming 2 liters of water containing 15 ppb picloram, would not exceed 0.0006 mg/kg. The cases in which picloram of unknown source has been found in water supplies have uniformly involved low levels. The concern has not been with health risks per se but that some use practice has been improper.

Because of the rapid urinary excretion of picloram, tissue levels remain low and drop quickly after exposure. Tissue residues in cattle fed picloram have been found to be a small fraction of the dietary concentration, and that fraction is relatively constant across a wide range of doses. At a maximum residue level of 100 ppm per pound applied, the greatest expected forage concentration of picloram would be 200 ppm. At that concentration, maximum muscle concentration should be about 0.05 ppm (Kutchinski and Riley 1969), and the concentration in liver would be about twice this amount. A half kilogram of liver consumption daily would therefore carry 0.05 mg picloram, or 0.001 mg/kg for a 50 kg person.

Although use rates for picloram are lower than those for 2,4-D, the same assumed maximum concentrations of 10 ppm in berries will be used in estimating exposure. Picloram accumulates in fish to a concentration much lower than the concentration in ambient water, according to research by the manufacturer quoted by the National Research Council of Canada (1974) review of picloram. Any consumption of such fish represents less exposure than consumption of water.

A comparison of the maximum doses expected for applicators (0.05 mg/kg/day) or nonoccupationally exposed people shows that the short duration of exposure and low exposure in the field leads to a dose that is at least 1,500 times lower than the no-effect doses for general toxicity and reproductive effects, which are characterized by a threshold. That picloram does not represent a calculable carcinogenic hazard is shown by the absence of mutagenic activity, the rapid disposition of the chemical, and the limited tendency toward tumor formation in experiments at lifetime dose rates some 10,000 times higher than brief doses in the field.

Because of the absence of data to support a conclusion that picloram is not carcinogenic and the controversy surrounding the use of this chemical, an assessment of cancer risks is needed.

Common Name: Glyphosate

Chemical Name: N-(phosphonomethyl) glycine

Major Trade Names: Roundup, Rodeo

Major Applications in Noxious Weed Control: Glyphosate is used to control many annual, biennial, and perennial broadleaf weeds and grasses in noncropland areas.

Summary

Because glyphosate is a relatively new pesticide, the environmental fate and potential ecological effects of its use have not yet been extensively studied. The small amount of existing data was obtained almost entirely from greenhouse and laboratory studies with agricultural systems and laboratory animals, studies largely generated by the manufacturer. This data shows glyphosate's high effectiveness, short persistence in soil and water, and low toxicity to animals.

Glyphosate is absorbed almost exclusively via plant foliage and is translocated throughout the plant. Less then 1 percent of the glyphosate in the soil is absorbed via the roots. Glyphosate is apparently not metabolized to a significant degree in plants, and its mode of action is believed to involve inhibition of aromatic amino acid syntheses.

That glyphosate is rapidly and strongly adsorbed to soil particles accounts for its observed lack of mobility, its leaching tendency in soil, and its unavailability for root uptake. Adsorption to soil is believed to be through the phosphonic acid component. The phosphate level in the soil influences the amount of glyphosate adsorbed, and glyphosate adsorption is greater in soils with high concentrations of trivalent metals such as aluminum and iron, rather than high concentrations of sodium and calcium.

Dissipation of glyphosate in soil is fairly rapid (half-life of about 2 months) and mainly results from microbial degradation. The main soil metabolite of glyphosate is aminomethylphosphonic acid (AMPA), which itself is also highly biodegradable. Glyphosate is subject to biodegradation in natural waters and has an estimated half-life of 7 to 10 weeks.

At normally recommended application rates, glyphosate should not be toxic to animals . Bioassays on several aquatic invertebrates and fishes have found 96-hr LC_{50} values ranging from 2.3 mg/1 for fathead minnows to 43 mg/1 for mature scuds. Animal feeding studies with glyphosate have found low toxicity to rat, mallard duck, and quail and little or no potential for bioaccumulation. Teratogenicity was not detected at test dosages. No evidence exists for the carcinogenicity or mutagenicity of glyphosate, although glyphosate can cause skin and eye irritation to applicators.

The following source documents present detailed information on the fate and behavior of glyphosate in the environment and potential impacts: Ghassemi and others 1981; USDA, FS 1984; and DOE, BPA 1983. In accordance with 40 CFR 1502.21, these documents are incorporated by reference into this EIS. The following discussions on toxicity and hazard assessment were extracted from pages 19-21 of the report "An Analysis of Human Health Hazards Associated with Some Herbicides Used in Forestry," prepared for BLM by Dr. Frank N. Dost (1983), and "Pesticide Background Statements," USDA, FS 1984.

Toxicity

Most data on the toxicity of glyphosate are proprietary, however summary information can be obtained. F.N. Dost and J.M. Witt, however, have examined the experimental data submitted for registration and have found that the data are accurately reflected in existing summaries.

The chronic toxicity of glyphosate has been evaluated in rats and dogs. In a long-term feeding study, groups of 50 male rats and 50 female rats were fed 30, 100, or 300 ppm glyphosate in their diets for 2 years. No significant differences resulted in food consumption, weight gains, or final body weights among the test and control groups. Hematological, clinical, chemical, and urine analyses conducted at 3, 6, 9, 12, 15, 18 and 24 months on animals fed 300 ppm found no abnormalities. Histopathologic examination revealed a treatment-related increase in lipid content in the liver of animals fed 300 ppm, but these changes were not present in the livers of rats fed 30 or 100 ppm.

Groups of four male and four female dogs were fed 0, 30, 100, or 300 ppm glyphosate in their diet for 2 years. No consistent differences occurred between values in the control and treatment groups. Absolute organ weights, organ-to-body weight ratios, and organ-to-brain weight ratios revealed no significant differences between test and control dogs. No gross histopathologic changes were observed in the livers of dogs fed 30, 100, or 300 ppm for 2 years.

No treatment-related effects in parental or pup body weight gain, behavior, survival, or reproductive performance were observed in a three-generation reproduction study in which rats were fed glyphosate at dosages of 3, 10, and 30 mg/kg body weight (30, 100, and 300 ppm). Gross pathologic examination found no differences between treated and control animals. Organ weights, organ-to-body weight ratios, and organ-to-brain weight ratios revealed no consistent differences. Histopathologic examination revealed no treatment-induced lesions.

No other adverse effects on reproductive ability were noted except for slightly reduced mating indices in high-dose female of the third generation only and slightly reduced pregnancy rates at all treatment levels of the first generation only. These changes were not considered treatment related. Gross and microscopic examination of randomly selected offspring of the third generation revealed no significant differences between treated and control groups (Monsanto data reported in USDA, FS 1984).

Pregnant rats were treated with glyphosate at dosages of 300, 1,000, and 3,500 mg/kg/ day on days 6 through 19 of gestation, the period of organogenesis. No evidence of birth defects in the offspring was observed (Monsanto Co. 1982). Treatment of pregnant albino rabbits with dose levels of 75, 175, and 350 mg/kg body weight on days 6 through 27 of gestation did not induce a teratogenic response (Monsanto Co. 1982).

No evidence exists that glyphosate is a mutagen. Male mice were given 200, 800, or 2,000 mg glyphosate/kg body weight and later mated with untreated females. No evidence of mutagenicity was observed in the dominant lethal mutation assay, indicating that the test material is not genotoxic to germ cells. Three different types of microbial mutagenicity tests were performed with seven strains of bacteria and one of yeast. No mutagenic effect was reported in any of these strains (Monsanto Co. 1982).

In an 18-month study, Swiss mice were fed glyphosate at dietary levels of either 100 or 300 ppm. Gross and microscopic pathologic examinations found no correlation between treatment and tumor incidences in the treated mice. A carcinogenic response was not induced. The incidence or pattern of mortalities did not significantly differ between treatment and control groups (Monsanto data reported in USDA, FS 1984). Similar results have been reported in rats and dogs fed glyphosate at dietary levels up to 300 ppm for 2 years. In a more recent lifetime study (Monsanto Co. 1983), no carcinogenic effects were observed when glyphosate was fed to rats at dosages up to 31 mg/kg.

The EPA indicates that a treatment-related increase in the incidence of renal tumors has been found in a recent chronic mouse feeding study conducted with glyphosate. The tumors (renal tubule adenomas) occurred in three out of 50 male mice fed a diet containing 30,000 parts per million (ppm) or 3 percent glyphosate. The same type of tumor was also found in one of 50 animals fed 5,000 ppm (0.5 percent) glyphosate. The original pathology report indicated no renal tubule adenomas among 49 animals fed 1,000 ppm (0.1 percent) glyphosate or among the control animals. The registrant has recently submitted information indicating that one animal in the concurrent control group was found to have a renal tubule adenoma. EPA has obtained the relevant slides and is reviewing this finding.

EPA concludes that these tumor results are not statistically significant when each treated group is compared to the concurrent control. However, the tumor has rarely been found among untreated (control) mice and there is a statistically significant increase in the glyphosate treated male mice when compared to appropriate historical control findings. There is also a statistically significant dose-related trend. Therefore, EPA considers the study to be positive for oncogenicity at this time.

It should be noted that no statistically or biologically significant increases in tumors were found among female mice from the same study. In addition, a long-term oncogenic study conducted with rats was negative for oncogenicity. Several appropriately conducted and scientifically acceptable mutagenicity tests were also negative.

Thus, in well-conducted oncogenicity studies on both sexes of two species, the incidence of only one tumor type in one sex of one species was found to have an increase related to treatment with glyphosate. This increase in tumors occurred only at very high exposure levels (much higher than usual in long-term studies of pesticides). Furthermore, the positive finding depends upon the presence of tumors in only four treated animals.

EPA has indicated that the evidence for oncogenicity, though present, is extremely limited. According to their proposed carcinogen risk assessment guildelines (49 FR 46294), glyphosate would be classified in Category C which is used for agents with limited evidence of carcinogenicity in animals in the absence of human data. Category C is the lowest weight-of-evidence category among the categories with any positive evidence.

Hazard Assessment

Exposure to glyphosate must be considered in the same terms that describe exposure to the phenoxy herbicides. Because of lower application rates, ground application crews may experience a maximum intake of 0.05 mg/kg, assuming rates of absorption similar to those of 2,4-D. Because of the tenacious binding of glyphosate to foreign material, an absorption rate for glyphosate as high as that of 2,4-D is questionable.

Contamination of water will dissipate quickly because of the binding of glyphosate to sediment and its exclusion from routes leading to human consumption. Nonetheless, a transitory concentration of 7-10 ppb may occasionally occur and can be used in this assessment.

Drift of glyphosate will behave as any other herbicide, with deposition at 100, 500 and 1,000 feet of about 0.1, 0.005, and 0.001 mg/ft2 per pound applied/acre. At 100 feet, skin absorption following contact with 0.2 mg/ft will be about 0.04 mg at maximum of 0.0008 mg/kg.

Consumption of glyphosate by game animals will be followed by rapid elimination, and no significant exposure should result from eating game. Glyphosate is applied in spring and summer into September. Concentration at the levels of vegetation used as browse may range from 20-200 ppm at application, depending on the density of the canopy. Degradation half-life is about 10 days in vegetation, and concentrations from late application will decrease before the hunting season by 12-25 percent of the original levels. Earlier applications will have disappeared. If the extreme of 200 ppm is accepted, a deer consuming load at a rate of 3 percent of body weight daily will take in 6 mg/kg/day. Studies with the herbicide triclopyr show the tissue burden in liver to be about 2 percent of dietary intake in mg/kg and muscle concentration to be 1.5 percent or less. The rapid excretion of glyphosate suggests that this same relationship can be used here, but at any given time body burden should be even less. The expected maximum tissue concentration should be about 0.12 ppm.

An occupational intake of 0.05 mg/kg is less than the no-effect level of 30 mg/kg/day for teratogenesis by a factor of 600. The maximum environmental exposure would hypothetically result from eating deer meat, leading to a dose of 0.0012 mg/kg, which is less than the reproductive NOEL dose by a factor of 25,000.

In addition to the limited amount of qualitative evidence supporting a conclusion of oncogenicity, a quantitative risk estimate indicates that, to the extent that glyphosate is actually an oncogen, it is likely to have only a weak oncogenic effect. This is primarily related to the extremely high doses at which effects were observed in the recent study provided to EPA as compared to likely human exposure. Therefore, based on the information currently available, EPA does not expect any significant risk from the level of glyphosate to which humans are likely to be exposed. Because of this limited amount of qualitative evidence indicating a weak oncogenic effect, an assessment of cancer risks is needed.

Glyphosate potentially contains a genetically active contaminant, N-nitrosoglyphosate. EPA has determined that to the extent it occurs in glyphosate, it does not represent a mutagenic or carcinogenic hazard.

Synergistic Effect of Mixtures

Synergistic effects of herbicides are those (1) that occur due to simultaneous exposure to more than one herbicide and (2) cannot be predicted on the basis of effects of the individual chemicals. Synergistic effects could occur as a result of exposure to two or more of the herbicides considered in the analysis. Kociba and Mullinson (1985) in describing toxicological interactions with agricultural chemicals state:

- Our present scientific knowledge in toxicology indicates that an exposure to a mixture of pesticides is more likely to lead to additivity or antagonism rather than synergism when considering the toxicological effects of such a combination. To be conservative and for reasons of safety, an additive type of toxicological response is generally assumed rather than an antagonistic type of response.

  In the case of registered pesticides, a great amount of toxicological information is developed during the research and development of each individual pesticide. In addition to this information on individual pesticides, short term toxicity studies are always done prior to the selling of a pesticide mixture. Should synergism unexpectedly be present in a proposed commercial mixture of two pesticides, it would be identified in such cases and would then be dealt with accordingly. In toxicological tests involving a combination of commercial pesticides, synergism has generally not been observed.

Kociba and Mullison (1985) use a specific example of a mixture of 2,4-D and picloram to illustrate their point. They list the LD_{50}'s of each herbicide separately and the LD_{50} of the mixture. The mixture LD_{50} is between the LD_{50}'s of the two constituents indicating lack of a synergistic effect.

For several reasons, synergistic adverse effects are highly unlikely to result from exposure to more than one herbicide applied in separate projects. First, none of the four herbicides accumulate in human tissues, so exposure of an individual to two herbicides at different times would be unlikely to cause simultaneous residues within the body. Second, herbicide exposures are typically small. The greater exposures considered in the extreme scenarios could occur only infrequently, and the probability of accidental exposure is low. Third, because the probability of a large exposure is small for any one chemical, the probability of large simultaneous exposures to multiple chemicals is negligible because the probability of two independent events occurring simultaneously is the product of the probabilities of the individual events. For example, if the probability of a person receiving a given exposure is 1 in 1,000 for two herbicides, then the probability of receiving that exposure to both herbicides would be 1 in 1 million.

Simultaneous exposure to more than one chemical is likely in cases when those chemicals are combined in a single spray mixture. Most vegetation control projects in the EIS area involve only a single herbicide, but a significant number of acres are treated with herbicide mixtures. The only herbicide mixtures used, however, are combinations that have been registered for use by the Environmental Protection Agency (EPA). EPA has considered the possibility of synergistic effects in these cases and found that the risk is not significant.

Wildlife Health Effects

It has been suggested that BLM consider the impacts of this program on the health of fish and wildlife because of the dose levels for animals portrayed in the worst-case analysis (Appendix N). The dose levels depicted are a direct result of feeding studies. Duplication of these conditions in the field would require the application of herbicides in extremely large amounts which would far exceed label recommendations.

A risk analysis on fish and wildlife exposure to herbicides is presented in the Final Environmental Impact Statement on the Eradication of Cannabis on Federal Lands in the Continental United States. That analysis has been incorporated by reference. A summary of the analysis is as follows.

The FEIS on the Eradication of Cannabis on Federal lands analyzes two of the compounds of the noxious weed control program (2,4-D and glyphosate). After examining the chronic dose levels to humans in this document and comparing the results with the FEIS cited above, BLM has concluded that these two compounds have greater potential for both acute and chronic effects than do dicamba and picloram.

To determine the risk of impacts on the health of wildlife that may result from noxious weed control with herbicides, an analysis of the herbicides' risk to wildlife compared estimated acute exposures for representative wildlife species with available hazard information on closely related species. Herbicide exposures for these representative species were calculated using a series of very conservative, simplified assumptions concerning routine case spraying operations and extreme case accidental scenarios.

Although numerous studies indicate that animals such as deer are repelled by herbicide residue, in the extreme case animals are assumed to be exposed directly to the full rate of active ingredient applied per acre and their entire diet assumed to consist of vegetation containing herbicide residue. Under the routine case it is estimated that only 5% of the diet would contain herbicide residue. Table K-1 shows the representative wildlife species and parameters considered. Because 2,4-D is the higher risk chemical proposed for use in the noxious weed program for both acute and chronic effects, the dose levels to wildlife have been included in Table K-2.

Table K-2 shows that in the routine case scenario, no individual animal would receive a dose that is more than 11 percent and 1 percent of its median lethal dose (LD_{50}) for 2,4-D and glyphosate, respectively. However, in the extreme case, mice would receive a dose that is 52 percent and 3 percent of their LD_{50} for 2,4-D and glyphosate, respectively, and toads would receive a dose that is 70 percent of the 2,4-D LD_{50} for tadpoles. Therefore, it is possible that under the very unlikely extreme case, some individual small animals could receive a lethal dose of 2,4-D as a result of this program.

Risks to aquatic species were assessed based on populations inhabiting a 6-inch-deep stream. Larger streams would greatly reduce the concentration. Table K-3 presents a comparison between the lethal concentration (LC_{50}) and possible initial concentrations for the routine and extreme case scenarios.

In an aquatic extreme case scenario involving rainbow trout, bluegill, fathead minnow, crayfish, stonefly nymph, and amphipods (the most sensitive species), the analysis for 2,4-D shows that the most sensitive species (amphipods) could be exposed to 19 percent of the median lethal concentration (LC_{50}).

The aquatic extreme case for glyphosate (USDJ, DEA, 1985) shows that a temporary exposure dose to bluegill could reach 61 percent of the lowest LC_{50} reported for that species, but concentrations would decline rapidly and exposures would be brief. Therefore, no aquatic organism should receive a dose of glyphosate large enough to result in adverse effects.

Based upon a review of BLM monitoring data, it is concluded that concentration levels as high as those for the routine case scenario in the referenced analysis are unlikely to occur. BLM monitoring data for picloram (Chapter 2, Water Resource) shows that less than 35% of the samples taken contained a detectable level of residue, and that the maximum concentration was 0.18 micrograms/liter (0.00018 ppm). Thus, acute and chronic toxic effects would occur only from extreme case accidental spill exposures in localized areas.

In the extremely unlikely event that small animal or aquatic species should receive a lethal dose from the weed control program, individual fatalities would result. Such fatalities, however, would have no significant impact on the overall population of the species.

Table K-1. Representative Wildlife Species With Associated Biological Parameters

Representative Feeding Niche	Species	Body Weight (Grams)	Daily Food Intake (Grams)	Body Surface Area (cm²)	Vegetation Contact Factor (Percent)	Grooming Factor (Percent)	Inhalation Rate (ml/sec)
Insectivorous Birds	Flicker	75	16	178	40	38	0.55
Granivorous Birds	Dove	100	11	218	39	37	0.80
Omnivorous Birds	Jay	70	14	170	41	39	0.45
Piscivorous Birds	Kingfisher	250	50	NA	NA	NA	NA
Carnivorous Birds	Owl	100	20	NA	NA	NA	NA
Small Omnivorous Mammals	Mouse	20	6	74	93	71	0.32
Medium Herbivorous Mammals	Rabbit	1,350	130	1,224	60	20	14
Large Herbivorous Mammals	Deer	68,000	2,450	16,686	39	29	185
Carnivorous Mammals	Fox	5,670	475	3,189	51	NA	25
Insectivorous Amphibians	Toad	22	5	79	90	NA	0.12
Carnivorous Reptiles	Garter Snake	40	20	NA	NA	NA	NA

NA—Not applicable

Table K-2. Wildlife Dose Levels of

Species	Routine Case Dose	Extreme Case Dose	Median Lethal Dose LD_{50} [1]	Lab Animal
		2,4-D (mg/kg)		
Flicker	13.7	123.33	472 (T)	Pheasants
Dove	8.71	41.35	472 (T)	Pheasants
Jay	12.85	97.95	472 (T)	Pheasants
Kingfisher	0.617	0.42	472 (T)	Pheasants
Owl	7.93	23.63	472 (T)	Pheasants
Mouse	39.64	197.9	380 (BE)	Mouse
Rabbit	5.52	44.7	424 (BE)	Rabbit
Deer	1.14	13.76	400 (A)	Mule Deer
Fox	2.02	9.27	100 (A)	Dog
Toad	18.04	139.9	200 (M)	Tadpoles (96 hour)
Snake	19.82	59.1	200 (M)	Toad TL_{50} (96 hour)
Eggs	9.42	47.1	No adverse effects at up to 35 mg/kg	Hen Eggs
		Glyphosate (mg/kg)		
Flicker	7.21	64.9	4,640	Quail
Dove	4.59	21.78	4,640	Quail
Jay	6.76	51.51	4,640	Quail
Kingfisher	0.0087	0.22	4,640	Quail
Screech Owl	4.17	12.44	4,640	Quail
Mouse	20.86	104.2	4,000	Rat
Rabbit	2.91	23.53	3,800	Rabbit
Deer	0.60	7.22	3,800	Rabbit
Fox	1.06	4.86	3,800	Rabbit
Toad	9.49	73.65	[2]	
Snake	10.43	31.1	[2]	
Bird Eggs	4.96	24.78	[2]	

[1] BE = Butyl Ester, A = Acid, T = Technical, and M = Amine.

[2] No studies available.

Table K-3. Comparison of Median Lethal Concentrations With Estimated Initial Concentrations

For 2,4-D in Parts Per Million (ppm)

Species	Estimated Initial Concentration		Median Lethal Concentration LC$_{50}$
	Routine Case Scenario	Extreme Case Scenario	
Rainbow trout	0.083	2.10	1.42-10.5
Bluegill	0.083	2.10	1.02-14.5
Fathead minnow	0.083	2.10	1.0-5.6
Crayfish	0.083	2.10	40-100
Stonefly nymph	0.083	2.10	1.6-8.5
Amphipod (most sensitive species)	0.083	2.10	0.44-1.4

For Glyphosate in Parts Per Million (ppm)

Species	Routine Case Scenario	Extreme Case Scenario	Median Lethal Concentration LC$_{50}$
Rainbow trout	0.044	1.10	2.4-48
Bluegill	0.044	1.10	1.8-24
Fathead minnow	0.044	1.10	2.4-9.4
Crayfish	0.044	1.10	1000
Stonefly nymph	0.044	1.10	Not available

Appendix L
Toxicity of Dioxins in Herbicides Proposed for Use

Much confusion exists because of the use and misuse of the term dioxin. The term can refer to any one of about 75 polychlorinated dibenzodioxins (PCDD). But to many people, dioxin has become synonymous with 2,3,7,8-T4CDD, the only known dioxin with toxicity of any significance. The confusion has been compounded by free use of the abbreviations DCDD (for dichlorodibenzodioxin) and TCDD (for tetrachlorodibenzodioxin). There are 22 compounds of tetrachlorodibenzodioxins, and each compound acts differently in the environment. Common use of the term TCDD to mean 2,3,7,8-tetrachlorodibenzo-p-dioxin has caused some readers to assume all TCDDs are of the same toxicity, which is not the case. For example, 2,4-D studies have found traces of several dichloro-, trichloro-, and tetrachlorodibenzo-p-dioxin impurities, but none are thought to be particularly toxic (NRCC 1981). Recent studies, such as the 1981 Canadian publication "Polychlorinated Dibenzo-p-Dioxins: Criteria for their Effects on Man and His Environment" (NRCC 1981), refer to each specific PCDD by name, which clears up much of the confusion.

Manufacturing processes have been refined over the past few years to reduce impurities. A trade memorandum from Agriculture Canada's Food Production and Inspection Branch, dated August 28, 1981, stated, "Through this review, it has been possible to identify certain technical products that can be expected to be virtually free of PCDDs" (NRCC 1981).

Of the herbicides proposed for use by alternatives discussed in this EIS, only 2,4-D has been found to contain dioxins, and these dioxins are practically nontoxic (NRCC 1981). The following discussions have been extracted and included here for clarification. The term TCDD used in the extracts refers to 2,3,7,8-T4CDD.

Impurities occur in many organic synthesis procedures. Dioxins are among the trace impurities in all the phenoxys. There are 75 chlorinated dibenzodioxins, of which many occur in the chlorinated phenols and products made from them. Three dioxins have been found in 2,4-D, of which all are of limited toxicity. The initial finding of chlorodioxins in 2,4-D of Canadian manufacture (Cochrane and others 1980) showed substantial levels in certain formulations. U.S. EPA immediately assayed 30 formulations manufactured in the U.S. and in 3 samples found traces of 2,7-dichlorodibenzo-p-dioxin, the species to be expected in 2,4-D manufacture. No sample contained more than 60 ppb, which does not represent a toxicologic concern.

Extract from DOE, BPA 1983, page A-145. Chlorodibenzodioxins other than TCDD are of less concern because of low toxicity. Schwetz and others (1973) reported that 2,4-dichlorodibenzo-p-dioxin and octachlorodibenzo-p-dioxin have low toxicity whereas TCDD was extremely toxic. Low dosages of TCDD (0.0005 to 0.001 mg/kg/day) were toxic to rats, whereas 1,2,3,4-tetrachlorodibenzo-p-dioxin, 2,7-dichlorodibenzo-p-dioxin, 2,3-dichlorodibenzo-p-dioxin, and 2-chlorodibenzo-p-dioxin at dosages up to 2 mg/kg/day had little or no effect (Khera and Ruddick 1973).

2,4-D is synthesized from 2,4-dichlorophenol and therefore does not contain TCDD (Bovey and Young 1980). Three other chlorodibenzodioxins of low toxicity have been found in 2,4-D manufactured in Canada (Cochrane and others 1980). Analysis of 30 U.S. samples of 2,4-D revealed 2,7-dichlorodibenzo-p-dioxin in three formulations. No sample contained more than 60 ppb of 2,7-dichlorodibenzo-p-dioxin, which does not represent a toxicologic concern (Newton and Dost 1981). As part of the National Cancer Institute bioassay, a 2-year feeding study was conducted. Male and female rats and mice were fed 10 ppm (10,000 ppb) 2,7-dichlorodibenzo-p-dioxin. The panel of the National Cancer Institute concluded that 2,7-dichlorodibenzo-p-dioxin was not a carcinogen.

Appendix M
Toxicity Research Costs

Council on Environmental Quality regulations (40 CFR 1502.22) require that gaps in relevant information or scientific uncertainty be included in an EIS unless the cost of obtaining such information is exorbitant. It would be virtually impossible for BLM with its limited resources to conduct the research on toxicity of herbicides needed to answer the questions that have arisen either from data gaps or scientific discord. Neither 2,4-D nor picloram has been shown to be a potent carcinogen. To identify a sample population large enough to differentiate between cancer indused by exposure to these herbicides and cancer caused by exposure to other environmental, factors such as diet, polluted air, drinking water, or predisposition by other natural factors, would be a prohibitatively time consuming (3-5 years) and costly process. The cost exorbitance of such research is shown in Table M-1. In response to existing data gaps on 2,4-D and picloram, registrants are conducting research. On the basis the cost of filling the research gaps identified for the program level, the cost of filling the data gaps has been determined to be exorbitant unless a worst-case analysis finds a substantive risk of cancer.

Estimated Costs of Research to Fill Data Gaps or to Resolve Scientific Uncertainties Pertaining to 2,4-D, Picloram, and Glyphosate

Test	Cost Estimate ($)[1] 1984	2,4-D	Picloram	Glyphosate
Acute Toxicity (including dermal,inhalation and oral in guinea pigs and dogs)	110,000	●	●	
Subchronic Toxicity (including dermal, inhalation, and oral in rats, dogs, and rabbits.)	525,254		●	●
Chronic Toxicity (three-phase tests in rats and dogs)	1,685,165	●	●	●
Oncogenicity (three-phase tests in rats and mice)	1,576,186	●	●	●
Teratogenicity (three-phase tests in rats and rabbits)	129,760	●	●	
Mutagenicity (including Ames test, mutation assays, sex-linked lethal assays, somatic cell mutations, and locus gene mutations)	36,131		●	
Chromosomal Effects (including cytogenetics, heritable translocations, and unscheduled DNA synthesis)	110,000		●	●
Total	4,172,496	3,501,111	4,172,496	3,896,605

[1] Based on Centaur Associates estimates from 1980 to 1982 and updated using the Consumer Price Index.

Appendix N
Worst-Case Analysis Impacts on Human Health From Using 2,4-D, Picloram, and Glyphosate

Scientific uncertainty exists about the carcinogenicity potential of the herbicides 2,4-D, picloram, and glyphosate. This appendix analyses the risks to human health of proceeding with the Proposed Action in the face of that uncertainty, i.e., the hypothesis is valid that 2,4-D, picloram, and glyphosate are carcinogenic. The analysis presented may best be labeled as the worst-case to human health from using 2,4-D, picloram, 2,4-D/picloram mixture, and glyphosate to control and eradicate noxious weeds on the public lands. The analysis also indicates the probability of the worst-case occurring.

The worst-case analysis addresses the following:

Necessity of a Worst-Case Analysis
- Nature of the scientific uncertainty
- Cost of additional research
- The worst-case analysis requirement

Worst-Case Analysis
- Overview
- Summary of project description
- Expected and unintended events
- Exposure levels for affected populations
- Review of herbicide toxicity and comparisons
- Incidence levels of cancer for affected populations
- Comparisons of cancer risks to death from involuntary occurrence
- Likelihood of the worst-case occurring
- Accidental spill scenarios

Necessity of a Worst Case Analysis

Nature of the Scientific Uncertainty

Scientific studies on whether 2,4-D is carcinogenic have evoked disagreement among experts. The two studies considered most acceptable have resulted in negative conclusions about 2,4-D's ability to cause cancer. In the first study which involved a large number of chemicals, Innes and others (1969) orally exposed mice of two strains to two different formulations of 2,4-D for 18 months. Eighteen mice of each sex and each strain were exposed to each formulation. Exposure to 2,4-D did not result in any significant increases in tumors in this experiment. In the second study, Hansen and others (1971) exposed Osborne-Mendel rats to 0, 5, 25, 125, 625, or 1,250 ppm 2,4-D in the diet for 2 years. There were 25 male and 25 female rats in each dosage group. No significant effect of dosage on survival was noted. The total number of rats with tumors in the control group was 15, and the tumors in the treated groups, by increasing dose, were 14, 18, 20, 23, and 22. Because the tumors were typical of those normally found in aging Osborne-Mendel rats and no target organ tumors were involved, the authors did not attribute these lesions to the feeding of 2,4-D.

Both studies' negative conclusions about the carcinogencity of 2,4-D have been accepted by the Federal Insecticide, Fungicide and Rodenticide Act Scientific Advisory Panel for the United States Environmental Protection Agency (EPA), the editor and editorial board of the professional journal Toxicology and Applied Pharmacology, and the National Cancer Institute. Nonetheless, one expert, Dr. M. Rueber, based upon his reexamination of the Hansen and others study disputes the conclusion that a carcinogenic effect for 2,4-D is not shown (Rueber 1979). The Scientific Advisory Panel, in their June 1980 report characterized the dispute as follows:

- "The FIFRA Scientific Advisory Panel has reviewed the chronic toxicity study on 2,4-D carried out in rats and dogs by Hansen and others which was published in Toxicology and Applied Pharmacology (TAP). In addition to peer review of this study by the editor and editorial board of TAP, the study has also been reviewed by the National Cancer Institute (NCI) and by Dr. M. Rueber. The NCI review agreed with the conclusion of the authors of this paper that a carcinogenic effect was not demonstrated for 2,4-D, whereas Dr. Rueber's conclusion was that 2,4-D is carcinogenic in male and female rats and probably also in mice. In Dr. Rueber's report, he agreed that this FDA study (Hansen and others 1971) must be considered as an acceptable study, and thus the major difference in the conclusions of Dr. Rueber and the authors of this study derives primarily from differences in the interpretation and evaluation of the rat histopathologic data. Dr. Rueber agrees with the authors of the FDA study that 2,4-D was not shown to be carcinogenic in dogs but argues that 2 years is an insufficient study period to detect carcinogenesis in this species. It should be pointed out that carcinogenic effects have been produced in dogs in studies of less than 2-year duration, and the 2-year period is the recommended exposure period in the current FIFRA guidelines for chronic toxicity studies in dogs. The FIFRA Scientific Advisory Panel recommends that the Agency attempt to resolve the apparent controversy between Dr. Rueber's pathological interpretation of the rat histologic findings and those of the authors of the FDA study before requesting any additional oncogenicity testing in rats with 2,4-D."

EPA has reviewed the data of controversy and subsequently required further specific toxicity studies. An ongoing chronic (2 year) rat feeding study will be complete in 1986. A task force of the manufacturers of 2,4-D is also conducting research on whether the compound is carcinogenic. The research is expected to be completed in 1986.

The issue of carcinogencity has also been raised in the case of picloram. A carcinogenesis bioassay of picloram in rats and mice was conducted by Gulf Research Institute for the National Cancer Institute (1978). This study found a relatively high incidence of foliar hyperplasia, C-cell hyperplasia and C-cell adenoma of the thyroid in both sexes of rats. The statistical tests for adenoma, however, did not show sufficient evidence of association of the tumor with picloram administration. There was evidence that picloram affected the livers of rats of both sexes. No tumors were found in male or female mice or male rats at incidences that could be significantly associated with treatment, and the study concluded that picloram was not carcinogenic for mice or male rats. In female rats, however, incidence of neoplastic nodules (benign tumors) was associated with picloram treatment. The study concluded that under the bioassay conditions, the findings were suggestive of the ability of picloram to induce benign tumors in the livers of female Osborne-Mendel rats. According to a classification scheme devised by the National Cancer Institute (NCI), however, picloram was listed among chemicals where evidence for carcinogenicity in animals was equivocal at best (Griesemer and Cueto 1980).

From his examination of the histological sections, Rueber (1981) interpreted the results of the NCI bioassay differently when he concluded that picloram was carcinogenic for all test animals except mice tested at the lowest dose. This interpretation differs from that of the panel of experts (the former NCI Data Evaluation/Risk Assessment Subgroup of the Clearinghouse on Environmental Carcinogens), who evaluated and interpreted the bioassay experiment.

More research has yet to be completed on picloram's carcinogencity. Research on picloram is being conducted by Dow Chemical Company (1984). The Research is expected to be completed in 1986.

Glyphosate has recently been studied in a new test. The EPA indicates that feeding study showed a treatment-related increase in the incidence of renal tumors in male mice. The tumors (renal tubule adenomas) occurred in three out of 50 male mice fed a diet containing 30,000 parts per million (ppm) or 3 percent glyphosate. The same type of tumor was also found in one of 50 animals fed 5,000 ppm (0.5 percent) glyphosate. The original pathology report indicated no renal tubule adenomas among 49 animals fed 1,000 ppm (0.1 percent) glyphosate or among the control animals. The registrant has recently submitted information indicating that one animal in the concurrent control group was found to have a renal tubule adenoma.

EPA has concluded that these tumor results are not statistically significant when each treated group is compared to the concurrent control. However, the tumor has rarely been found among untreated (control) mice and there is a statistically significant tumor increase in the glyphosate treated male mice when compared to appropriate historical control findings. There is also a statistically significant dose-related trend. Therefore, EPA considers the study to be positive for oncogenicity at this time.

It was noted that no statistically or biologically significant increases in tumors were found among female mice from the same study. In addition, a long-term oncogenic study conducted with rats was negative for oncogenicity. Several appropriately conducted and scientifically acceptable mutagenicity tests were also negative.

Thus, in well-conducted oncogenicity studies on both sexes of two species, the incidence of only one tumor type in one sex of one species was found to have a tumor increase related to treatment with glyphosate. This increase in tumors however, occurred only at very high dose levels (much higher than usual for long-term studies of pesticides). Furthermore, the positive finding is based upon the presence of tumors in only four treated animals.

Cost of Additional Research

In the case of both 2,4-D and picloram, the disagreement among experts arising from Rueber's conclusions suggests that data gaps exist. BLM does not have the staff, expertise, or funds to fill the existing data gaps, and the time required to perform these studies would seriously delay the execution of noxious weed control programs. To fill all the data gaps pertaining to the carcinogencity potential of picloram, glyphosate, and 2,4-D could require a total investment between $3.5 and 4.2 million, and at least 5 years of study per chemical. These figures are derived from cost estimates submitted to the EPA from Cenatur Associates, Inc. (1982), which are summarized in Table M-1 (Appendix M). The time estimates are based on historical data for toxicological research. EPA (1980) highlighted 2,4-D data gaps in the areas of oncogenicity, reproductive effects, and metabolism in animals. These studies would require expenditures within the lower cost estimate range. Additional research on chronic toxicity, teratogenicity, etc. could also be required, further adding to the costs. These costs are considered exorbitant.

The Worst-Case Analysis Requirement

The "worst-case analysis" regulation, 40 C.F.R. § 1502.22, was promulgated in 1979 by the Council on Environmental Quality (Council or CEQ). The regulation is one of many implementing the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 et seq. (1976), and it sets out the formal procedure an agency must follow when confronted with gaps in relevant information or scientific uncertainty about significant, adverse effects on the environment from a major federal action. The regulation requires an agency to make known when it is confronted with gaps in relevant information or scientific uncertainty. 40 C.F.R. § 1502.22. An agency then must determine if the missing information is essential to a reasoned choice among the alternatives. When the missing information is material to the decision, an agency ordinarily must obtain the information and include it in an environmental impact statement (EIS). 40 C.F.R. § 1502.22(a). If the means for obtaining the missing information are "beyond the state of the art," or alternatively, if the costs of obtaining it are "exorbitant," an agency must then prepare a worst case analysis. 40 C.F.R. § 1502.22(b). In this analysis, an agency must "weigh the need for the action against the risk and severity of possible adverse impacts where the action to proceed in the face of uncertainty." Id. An agency also is to indicate "the probability or improbability of its (the worst-case's) occurrence." Id.

On the basis of the discord surrounding the Hansen study and EPA's decision to undertake additional study, the courts have concluded that scientific uncertainty exists about 2,4-D's carcinogenic effect. See Save Our EcoSystems v. Clark, F.2d (9th Cir. 1984); Southern Oregon Citizens Against Toxic Sprays v. Clark, 720 F.2d 1475 (9th Cir. 1983); cert. denied, ______ U.S. ______ , 105 s.ct. 446, 83 L Ed. 2d 372 (1984). The disagreement among experts about picloram's carcinogenic effect is essentially the same as that surrounding 2,4-D. Hence, given existing judicial opinion, the agency is constrained to find that there also is scientific uncertainty about picloram's and glyphosate's carcinogenic effect. Regarding resolution of the scientific uncertainty surrounding 2,4-D's, picloram's, and glyphosate's carcinogencity, as indicated earlier, the costs of obtaining additional information to resolve that dispute are exorbitant (Appendix M). Accordingly, the BLM must prepare a worst-case analysis before proceeding with the use of 2,4-D, picloram, and glyphosate.

Worst-Case Analysis

Overview

The risk of proceeding with the use of 2,4-D, picloram, or glyphosate to control noxious weeds in the face of scientific uncertainty surrounding them is that the hypotheses about their carcinogencity are valid. Indeed, to accept the hypotheses validity is the worst-case to human health in the event that BLM proceeds with the proposed use of the three herbicides.

In analyzing the worst-case, BLM has attempted to establish incidence levels of cancer for different groups of persons who can be expected to be exposed to 2,4-D, picloram, and glyphosate. The incidence levels are expressed mathematically. The analysis also posits several different amounts (dose) and durations of 2,4-D, picloram, and glyphosate dosages to which persons will be exposed. In each scenario posited, the analysis focuses on amounts and duration of exposure in excess of what is foreseeable from the Proposed Action. Consequently, the incidence levels of cancer for persons exposed to 2,4-D, picloram, and glyphosate under this analysis would be greater than what could occur under the Proposed Action. The analysis also will relate the projected incidence levels of other risks to human health, both voluntary and involuntary, that persons confront in their daily lives.

Two populations are considered in analyzing the worst-case: the public residing in the areas where 2,4-D, picloram, and glyphosate are used and the occupational group of workers applying the substances. The analysis differentiates the public by age, i.e., incidence levels of cancer are projected for infants, adolescents, and adults. For these members of the public, incidence levels also are projected for each group according to whether they reside within 500 feet, 1/4 mile, or 1/2 mile of the area treated with the three herbicides. As for infants, adolescents, and adults, incidence levels are also projected according to whether they are exposed to 2,4-D, picloram or glyphosate as a result of either dermal exposure from herbicide drift or oral ingestion by consumption of water, meat, or vegetation containing herbicide residues. Occupational exposure to 2,4-D, picloram, and glyphosate and incidence levels of cancer from it are projected for pilots, mixer-loaders, supervisors, and observers where the herbicides are applied aerially. Where the three herbicides are applied by ground vehicle, incidence levels are projected for the drivers, mixer-loaders, and driver-mixer-loaders. Where the herbicides are applied on the ground by hand, incidence levels are projected for the applicator, who also mixes and loads.

The estimated doses of 2,4-D, picloram, and glyphosate to which persons are exposed are based on assumed errors in mixing, formulations, and applications.

Incidence levels of cancer resulting from exposure to 2,4-D, picloram, and glyphosate were analyzed from the basis of a one-hit model. The one-hit model assumes that any single dose of a carcinogen in a lifetime, no matter how minute, has some finite chance of causing cancer. The model is the most conservative in that it projects the greatest risks of any model used to project carcinogencity of a substance. Although within EPA the one-hit model has largely been displaced by a less conservative multi-stage model, BLM uses the former.

Summarily, the analysis is broken down by the following steps:

1. Identification of important elements in the herbicide application program including sizes of spray areas, locations of spray areas, herbicide application rates, and application methods.

2. Identification of the problems and misapplications that are possible with the herbicide spraying projects and a determination of the likelihood of these events.

3. Identification of the population potentially affected by using 2,4-D, picloram, and glyphosate (population at risk).

4. Estimation of the possible exposure and dosage of the affected populations taking into account various possible errors as well as unavoidable exposure intrinsic to the application process.

5. Review of the herbicide toxicity data and comparison of affected population dosage with the lowest chronic toxic no effect levels of 2,4-D, picloram, and glyphosate.

6. Determination of the risk for cancer in the affected population resulting from the use of three herbicides and a comparison of these risks with other voluntary and involuntary risks to human health that persons confront daily.

7. A determination indicating the probability of the worst-case occurring.

8. A discussion of potential accidental spill scenarios.

Summary Descriptions of Project Application Scenarios

Although 4,416 acres of the Proposed Action herbicide applications would utilize granular herbicide, for this analysis it is assumed that all herbicides would be a liquid formulation. This assumption is conservative, since exposure risk is greater with liquid spray applications.

Aerial - Under the Proposed Action, 5,900 acres are expected to be treated annually with 2,4-D and picloram by helicopter. As an extraordinary situation, 1.5 times as many acres (8,850) could be treated. Although this many acres could possibly be treated by a single crew, a conservative assumption of one crew in each of five states is used. In a typical year, relatively few areas with continuous extensive infestation of noxious weeds would be treated. Close proximity of these large aerial spraying projects to residences would be highly unusual. This analysis assumes five crews treating 1,180 acres each under the expected situation and 1,770 acres each under the extraordinary situation. It is assumed that all treatment areas over 200 acres would be treated by aerial application, although smaller acreage would be treated under rare circumstances.

An estimated 195 acres per day would be treated per crew, and an average helicopter load of 70 gallons would cover 14 acres (at a 5 gallon/acre application rate). Each helicopter would therefore apply 14 batches per day. Under the Proposed Action, it would take 6 crew exposure days (number of days for a crew to treat allocated acreage) to treat 1,180 acres (expected), and 9 crew exposure days to treat 1,770 acres under the extraordinary situation. Expected and extraordinary crew exposure days are presented by chemical and method of application in Table N-1.

Ground Vehicle - Under the Proposed Action, an estimated 13,415 acres (expected) would be treated annually with 2,4-D, picloram, and glyphosate by ground vehicle. Depending on the size of individual infested areas, the average-size treatment area is approximately 5 acres. It is assumed that ground vehicles could treat an average of 15 acres per day. Normally, application of herbicide by BLM occurs in sparsely populated or unpopulated areas. With adjacent landowner permission, applications are often made up to property boundaries.

The ground vehicles normally carry 200 gallons of spray mixture, which will cover approximately 15 acres. Accessibility and safety limits vehicle applications to flat or gently rolling terrain.

In the extraordinary situation, 1.5 times as many acres would increase the total acreage to 20,123 acres. Other factors such as average plot size would not change.

Based on a 15 acres per day treatment rate and an assumed 4 crews per state, there would be 45 crew exposure days for the expected situation. This would increase to 67 crew exposure days under the extraordinary situation (see Table N-1).

Ground Hand - Under the Proposed Action, estimated 1,658 acres (expected) would be treated by hand application of 2,4-D, picloram, and glyphosate. In the extraordinary situation (1.5 times as many acres), 2,487 acres would be treated. Hand application projects are assumed to be approximately 1 acre of noxious weeds spread over a 10-acre area. Hand applications would be utilized in areas that are too small to efficiently use other application methods, which require special protection. These would be areas such as;

- areas close to water
- riparian areas
- recreation areas
- areas not accessible to ground vehicles
- areas adjacent to residences

An estimated 4 acres would be actually sprayed per day per person, and an average load is 5 gallon mixture which would cover an estimated 0.25 acres (at a 20 gallon/acre application rate). An applicator would therefore apply 16 batches per day. Assuming 4 crews per state and an average of 8 acres (actually treated) per day treatment rate per crew, it would take 10.5 crew exposure days for the expected situation. This would increase to 16 crew exposure days for the extraordinary situation (see Table N-1).

Table N-1. Expected and Extraordinary Crew Exposure Days

Project Type/Chemical	Expected		Extraordinary	
	Anticipated Acres	Crew Exposure Days	Extraordinary Acres[4]	Crew Exposure Days
Aerial[1]				
2,4-D	2,170	3.0	3,255	4.0
Picloram	3,730	4.0	5,595	6.0
Ground Vehicle[2]				
2,4-D	8,750	29.0	13,125	44.0
Picloram	3,866	13.0	5,799	19.5
2,4-D/Picloram	694	2.5	1,041	3.5
Glyphosate	105	1.0	158	1.0
Ground Hand[3]				
2,4-D	879	5.5	1,318	8.5
Picloram	657	4.5	986	6.5
2,4-D/Picloram	80	1.0	120	1.0
Glyphosate	42	1.0	63	1.0

[1] Based on one crew per state - 195 acres per day/per crew.
[2] Based on four crews per state - 15 acres per day/per crew.
[3] Based on four crews per state - 8 acres per day/per crew.
[4] Extraordinary acres = (anticipated acres) x (1.5).

Expected and Unintended Events and Outcomes Associated With Herbicide Application and the Likelihood of These Events

Under the ideal circumstances, noxious weed chemical control programs would result in pesticide application at the proper rate to target organisms with little or no impact to nontarget organisms. Unfortunately, this assumption does not apply under all circumstances, and this analysis is based on a presumption that misapplication and off-target impacts could occur during the application process. Off-target impacts could result from:

- Drift of herbicides during application
- Errors of measurement during manufacturing and formulation
- Errors of measurement during field mixing
- Excessive swath overlap during application

Except for the topic of drift, there is no data on the effect or the rate of occurrence of these events during past noxious weed control programs. Therefore, estimates of the rate of occurrence of the other events are made which increase the apparent risk of these projects above what would likely occur. Rates of occurrence for over-strength mixing and misapplication are taken to the point that excessive use of the herbicide concentrate would be noticeable during mixing and corrective actions would be taken to prevent further overuse and wasteful expenditures.

Drift of Herbicide Off-target Was Assumed to Occur During Ground and Aerial Applications

Several investigators (Yates and others 1978; Maybank and others 1977) have studied herbicide drift from ground equipment as well as from aircraft. In terms of drift from ground-vehicle applications, Yates and his coworkers provide the most complete study of drift over relatively long distances (up to 1,000 meters). Maybank and his coworkers provide more complete data concerning deposition on target and deposition and drift of herbicide within short distances off-target. Both types of data are useful in determining the impacts of spraying under different application scenarios.

In determining rates of drift from ground application, the highest rate of drift found in tests of ground equipment by Yates and his coworkers or by Maybank and his coworkers are assumed to occur at all times during ground application in the EIS area. These drift rates greatly over-estimate drift from typical ground application since other tests have shown rates as much as 100 times lower than the rates used here. In addition, the drift rates used here were based on drift from tractor- or truck-mounted spray equipment employing high-pressure spray booms and spraying over 3 feet off the ground. In addition, BLM uses low pressure boom sprayers nozzled for drift reduction, therefore drift would be less than projected in these projections.

Table N-2 presents data from Yates and others (1978) on deposition of drift onto downwind mylar sheets. Data for 100-meter-wide spray areas are calculated by Yates from 10-meter wide spray swath data. Also presented are data on deposition of aerial application drift from 100-meter wide spray areas (Dost 1981). Data are expressed as that fraction of an application rate which could be expected to be deposited at a specified distance (500 feet, one-quarter mile, and one-half mile). Elements from Table N-2 were used to estimate doses for public dermal exposures.

Errors of Measurement During manufacturing and Formulation

Possible herbicide concentration errors resulting from poor quality-control in the manufacturing and formulation processes are accounted for. It is

Table N-2. Drift Deposition at Specified Distances From Spray Projects (in a 5 mph wind).

Ground Vehicle Application - 100 meter wide spray area	
Distance	**Mylar Sheet[1]**
500 feet	0.00049
1/4 mile	0.00017
1/2 mile	0.00007
Aerial Application[2]	
Distance	
500 feet	0.00054
1/4 mile	0.00011
1/2 mile	0.00002

[1] Expressed as the fractional portion of an application rate in mass/acre (e.g., kg/ha, lbs/ac, mg/m²). Taken from Yates and others 1978.

[2] Derived from An Analysis of Human Health Hazards Report (Dost 1981) presented in kg/ha/kg applied/acre.

assumed that all such errors result in higher concentrations of herbicide per gallon than is stated on the label. Allowances for a 4 percent manufacturing and formulation error are included, although errors of such magnitude are considered rare.

Errors of Measurement in the Field

Most pesticide formulations require additional dilution for field applications. Errors could occur due to improper calibration of metering equipment, unskilled use of measuring instruments, etc. Again it is expected that the actual diluted concentration would cluster about the appropriate dilution rate. However, this analysis assumes that all pesticide mixtures for field applications were mixed such that the pesticide concentration is 10 percent higher than called for (minor mixing error).

In addition, major mixing errors were assumed in which the pesticide concentration was 20 percent higher than called for. Both of these rates of mixing error are extremely high and their effects on consumption of the herbicide concentrate would be noticed and improper dilution problems corrected. Table N-3 contains a listing of herbicides, and application rates including rates involving minor and major mixing errors.

Excess Swath Overlap During Application

This analysis assumes that 5 percent of the land sprayed on any individual project is sprayed twice due to swath overlap. A 5 percent overlap is unlikely for basically the same reasons stated in the discussion on mixing errors. Such an overlap would result in a noticeable, excessive use of the herbicide concentrate requiring additional herbicide to complete treatment of a given area.

Exposure Levels for Affected Populations

Exposure to a herbicide refers to contact or potential contact between the chemical compound and the external surface of an organism which may result in the chemical being incorporated into cells or organs. Dose refers to the portion of the substance that is taken into the organism as a result of exposure. This distinction is made for several reasons. Exposure to herbicides during application is often a function of physical variables such as spray equipment, protective apparatus, wind speed, height of application, and concentration of herbicide applied. Thus, the dermal exposure to a worker using a backpack sprayer will be similar whether he is spraying 2,4-D, picloram or glyphosate, as long as all other variables are held constant.

The dose (or amount absorbed) from an exposure will often depend on chemical characteristics of the herbicide. For example, dermal dose is a function of the nature of the chemical and its interaction with cutaneous surfaces. The dose is different for each herbicide, although certain generalities on rate of absorption are possible and will be set forth in this section.

Table N-3. Listing of Herbicides and Application Rates Used for Noxious Weed Control. (Active Ingredient in Pounds per Acre)

Herbicide by Project Type	Expected Granular (kg ai/ha)	Expected Liquid (kg ai/ha)	Minor Mix Errors (kg ai/ha)	Major Mix Errors (kg ai/ha)
Aerial				
2,4-D		3.0 (3.36)	3.6 (3.99)	3.9 (4.33)
Picloram	1.0 (1.12)	1.0 (1.12)	1.2 (1.33)	1.3 (1.42)
Ground Vehicle				
2,4-D		3.0 (3.36)	3.6 (3.99)	3.9 (4.33)
Picloram	1.0 (1.12)	1.0 (1.12)	1.2 (1.33)	1.3 (1.42)
Mix - 2,4-D/		1.0 (1.12)	1.2 (1.33)	1.3 (1.42)
Picloram		0.5 (0.56)	0.6 (0.67)	0.7 (0.72)
Glyphosate		3.0 (3.36)	3.6 (3.99)	3.9 (4.33)
Ground Hand				
2,4-D		3.0 (3.36)	3.6 (3.99)	3.9 (4.33)
Picloram	1.0 (1.12)	1.0 (1.12)	1.2 (1.33)	1.3 (1.42)
Mix - 2,4-D/		1.0 (1.12)	1.2 (1.33)	1.3 (1.42)
Picloram		0.5 (0.56)	0.6 (0.67)	0.7 (0.72)
Glyphosate		3.0 (3.36)	3.6 (3.99)	3.9 (4.33)

Occupational Exposure and Dosage

Exposure and dose factors for workers involved in applying 2,4-D, picloram, and glyphosate are based on studies by Lavy and others (1982, 1984) and Nash and others (1982). The urine of workers was analyzed as an indication of worker dose from all routes (dermal, inhalation, and oral). Data on the amount of herbicide applied during the study period, which allowed normalization of data on a "per kilogram applied or mixed" basis, was provided by these studies. Several other studies of worker exposure and dose are reported in the literature, but these reports do not contain sufficient information to allow normalization of the data.

Table N-4 summarizes results of the Lavy and Nash studies representing "base case dose rates" computed on a 1.0 pound active ingredient per acre (lb ai/acre) (1.12 kg ai/ha) application rate. Listed exposures are the highest dose to any worker in the category and are therefore conservative. Additional conservatism is built in by the fact that all measurements were taken from workers wearing little protective clothing (short sleeve or sleeveless shirts, cotton pants, nonrubberized boots, and baseball caps.) Workers in the projects covered by this EIS, particularly for high exposure jobs such as mixer-loaders, will be required to wear protective clothing.

Dose levels of 2,4-D, picloram, and glyphosate to workers using various hand application control methods are compared in Lavy and others (1984). Average dosage on a "per kilogram applied" basis was 5 to 10 times greater for 2,4-D than for picloram. The difference in doses between the herbicides is not surprising when the data on dermal absorption of these herbicides is considered. Feldman and Maibach (1974) have shown dermal absorption rates for 2,4-D in the range of 8 percent, whereas Nolan and others (1984) have shown dermal absorption of picloram at less than 1 percent of the exposure amount while the absorption rate of glyphosate is about 6 percent. To be conservative, BLM rounds up the absorption rates to 1 percent for picloram and 10 percent for both 2,4-D and glyphosate. The difference in 2,4-D and picloram doses also supports the finding of inhalation and dermal sampling studies that have shown that inhalation doses for workers are negligible compared to dermally absorbed doses (see Lavy and others 1982 and 1980). For occupational exposures, it is assumed that the absorption of 2,4-D and picloram is the same. These are conservative estimates for absorption from picloram.

A list of the herbicides addressed in this analysis and the expected application rates by application method (aerial, ground vehicle and ground hand) are shown in Table N-3. Each treatment is adjusted for assumed minor and major errors in application and mixing (hereafter called mixing errors).

There are no data to indicate that consistent mixing error is ever experienced, therefore, under application and over application would reasonably balance out. However, for a conservative approach, all assumed mixing errors were for over application.

Assumed minor mixing errors are based on human error factors such as 4 percent formulation error (4 percent more "active ingredient" than is listed on the herbicide label), 5 percent over-application error due to swath overlap, and over mixing of "active ingredient" by 10 percent. The same assumptions apply for major mixing errors except that the over-mixing error is increased from 10 to 20 percent. For example, at a 1.0 lb ai/acre application rate, 19 percent (4 percent + 5 percent + 10 percent) more active ingredient is applied per batch due to minor mixing errors. Therefore, for a desired 1.0 lb ai/acre application rate, it is assumed that 1.2 lb ai/acre would actually be applied (for major mixing errors, 1.3 lb ai/acre).

Table N-4. Occupational Exposure Base Case Dose Rates (at 1 lb/acre Application Rate)

Occupation	Dosage (mg/kg/day)
Aerial	
Pilot	0.03
Mixer-loader	0.13
Supervisor	0.011
Observer	0.04
Ground Vehicle	
Driver	0.025
Mixer-loader	0.13
Driver-mixer-loader	0.155
Ground Hand	
Mixer-loader-applicator	0.06

Source: Nash and others 1982; Lavy and others 1982, 1984

Summaries of occupational dosages in mg/kg body weight/day are shown in Table N-5. Dosages are the products of application rate (Table N-3) x base case dose (Table N-4). The highest dosages for occupational exposures would occur to mixer-loaders and to those drivers who also mix and load in ground vehicle applications. These dosage estimates err on the high side for reasons described above. In actual practice, these dosages could be halved because of proper attention to protective measures and application detail.

Public Exposure and Dose

Potential doses to the public were developed based on several exposure pathways. These include dermal absorption of drift deposited on the skin, consumption of sprayed wild berries, consumption of wild game having fed on sprayed forage, and consumption of water with herbicide residues.

Off-target drift during herbicide application is one of several ways in which individuals in the vicinity of spray areas could be exposed to herbicides. Estimates of drift at 500 feet or greater distances from a 300-foot-wide spray area were based on the highest exposure determinations reported by Yates and others (1978) for drift from ground vehicle applications, and from Dost (1981) for aerial applications. Because of the methods of hand application (backpack sprayers, granular spreaders, wipers), the analysis assumes that insignificant drift results. Using data from Table N-2, one can project drift deposition onto bystanders (adults, adolescents, and infants) downwind of spray projects. In these analyses, it is assumed that adults weighed 70 kg, adolescents weighed 40 kg, and infants weighed 12 kg. It is assumed that adult exposed skin area is 0.37 m² (4 feet²), adolescent exposed skin area is 0.27 m² (3 feet²) and infant exposed skin area is 0.15 m² (1.6 feet²). All exposed skin is assumed to be directly in the drift pathway and fully exposed to drift (an extreme assumption). In a 5 mph wind, the downwind off-target deposition at 100 feet (edge of usual buffer strip) is expected to be 1 percent of the on-target rate; at 500 feet the deposition is about 0.05 percent (Yates and others 1978; Dost 1983). Deposition on clothing, unless drenched, does not result in significant absorption through the skin (Dost 1981). The dermal absorption rate is assumed to be 1 percent for picloram and 10 percent for 2,4-D (see Occupational Exposure and Dosage). Drift deposition at 500 feet from a 3.0 lb ai/ acre (3.36 kg/ha) ground application of 2,4-D would be 0.165 mg/m 2(3.36 kg/ha x 1,000,000 mg/kg/10,000 m² in a hectare x 0.00049 (from Table N-2)). The 500 foot drift dose to an adult would be 2.6 x 10^{-4} or 0.00026 mg/kg body weight ((0.165 mg/m 2x 0.37 m² exposed skin area) x70 kg adult weight x 0.10 absorption rate).

Computation of all adult, adolescent, and infant exposures by aerial and ground applications revealed that ground applications result in about 8.1 percent higher dermal exposures. Therefore, ground vehicle application dose estimates were used to compute dosages resulting from minor and major mixing errors (Table N-6). The daily dermal dosage from drift 500 feet downwind for 2,4-D, applied at 3.6 lb ai/acre including minor mixing errors, is 1.2 x 10^{-3} or 0.0012 mg/kg (2.6 x 10^{-4} ground vehicle dose x 3.99 kg/ha from Table N-3).

Table N-5. Summary of Dosages for Occupational Exposure (in mg/kg/day)

	2,4-D		Picloram		2,4-D/picloram		Glyphosate	
	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors
Aerial [1]								
Pilot	0.108	0.117	0.036	0.039	-	-	-	-
Mixer-loader	0.468	0.507	0.156	0.169	-	-	-	-
Supervisor	0.040	0.043	0.013	0.014	-	-	-	-
Observer	0.144	0.156	0.048	0.052	-	-	-	-
Ground Vehicle [1]								
Driver	0.090	0.098	0.030	0.033	0.045	0.050	0.050	0.098
Mixer-loader	0.468	0.507	0.156	0.169	0.234	0.260	0.468	0.507
Driver-mixer-loader	0.555	0.605	0.186	0.202	0.279	0.310	0.553	0.605
Ground Hand [1]								
Mixer loader-applicator	0.216	0.234	0.072	0.078	0.108	0.120	0.216	0.234

[1] Computed using the formula - (Application Rate x Base Case Dose), Tables N-3 and N-4 respectively.

Dermal exposures due to drift are highest for infants, adolescents, and adults, respectively. With major mixing errors, infant dosages would range from 0.00030 mg/kg at 500 feet to 0.000042 mg/kg at 0.5 mile for 2,4-D and glyphosate. Such dosages, although low, are unlikely as the analysis assumes that all exposed skin gets hit directly and that no skin is washed.

Estimates of oral dosages from ingestion of sprayed water are based on Dost (1983). At a theoretical expected concentration of 30 ppb in a 6-inch-deep stream (less than 2 percent of streams analyzed in western Oregon BLM spray treatments had concentrations from 11-20 ppb; 82 percent showed no detectable levels of herbicide) due to drift at 100 feet from the target area, an adult consuming 2 liters of water would receive a dose of 0.0012 mg/kg of body weight. This estimate assumes that the entire amount of water is consumed at one time and no dilution of the herbicide occurs. Adults are assumed to drink 2 liters, adolescents 1 liter, and infants 0.5 liters. This dose is assumed to result from 1.0 lb ai/acre. A summary of dosage estimates for public exposure, including minor and major mixing errors, is presented in Table N-6. A person drinking 2 liters of water immediately after it was sprayed with 2,4-D applied at 3.6 lb ai/acre (minor mixing error) would receive a dosage of 0.0043 mg/kg of body weight. Therefore, the dosage for an adolescent would be 0.0022 mg/kg from drinking 1 liter of water, or half of adult dose.

Estimates of oral doses from consumption of meat are based on several studies. Fang and Khanna (1966) reported 40 to 60 percent elimination of 60 to 100 mg doses of 2,4-D within 24 hours in rats. Cows and sheep fed up to 2,000 ppm 2,4-D in their diet for 28 days had average residue levels of less than 1.0 ppm in muscle, fat, and liver (Clark and others 1975).

Picloram is excreted very rapidly from mammalian systems. Nolan and others (1984) found that more than 70 percent of a human oral dose of 5.0 mg/kg was recovered in urine within 6 hours. Ninety percent of the compound fed to dogs was excreted within 48 hours (Redemann 1963, reported in National Research Council of Canada 1974; Fisher and others 1965). In two studies (McCollister and Leng 1969, and Kutschinski and Riley 1969) cattle fed from 1 to 1,600 mg/kg of picloram in feed for 4.5 to 8 weeks showed 0.05 to 0.5 mg/kg in muscle and fat, 0.12 to 2.0 mg/kg in liver and 2.0 to 18 mg/kg in kidneys. Kidneys contained less than 0.1 mg/kg when picloram was withdrawn from their diet 3 days before slaughter. The feeding studies reviewed above reveal that little bioaccumulation of 2,4-D, picloram or glyphosate occurs in mammals, particularly in edible muscle tissue.

Estimates of oral dose from consumption of wild game (deer) having fed on sprayed forage are based on estimates derived by Dost (1983) from registering data for triclopyr. Transfer of chemicals through game animals has been the subject of many studies. Triclopyr was given daily to goats for 10 days. Chemical concentrations were found only in the liver (0.004 ppm) and kidneys (0.013 ppm), with none found in muscle tissue. Assuming that a deer daily consumes 3 percent of its body weight in forage and that the maximum herbicide deposition rate is 4.0 lb ai/acre resulting in concentrations on forage of 400 ppm, a deer would ingest a total dose of 12 mg/kg. We assume for this analysis, that the maximum possible concentration of residue to accumulate in muscle would be 0.003 ppm or 0.2 mg/kg, and that an adult eats 0.5 kg. (1.1 lbs) daily, an adolescent 0.3 kg daily, and an infant 0.1 kg daily.

The dosage estimates (including mixing errors) with 2,4-D applied at 3.6 lb. ai/acre (3.99 kg ai/ha), that an adult would receive a daily dose of 0.0013 mg/kg of body weight (0.178/mg/kg based on minor mixing error application rate x 0.5 kg meat eaten/70 kg body weight). These estimates are conservative in that they do not consider the effects of cooking on the herbicide residue in meat.

Estimates of oral dose from consumption of wild berries are based on the review by Dost (1983). Studies by Siltanen and Rosenburg (1978) found a 7 ppm residue level of 2,4-D on berries from aerial spraying, whereas other studies have found concentrations from 0 to 6 ppm. Assuming a conservative on-site maximum concentration of 10 ppm from a 4.0 lb ai/acre application, drift 100 feet offsite would result in a maximum concentration of 0.1 ppm. Consumption of 0.25 kg (0.55 lb) a day by a 70 kg adult would result in a dose rate of 0.00036 mg/kg/day. The highest concentration measured in mushrooms was 4.5 ppm (Erne and Von Haartman 1983.) Since backback applications could result in up to three times higher herbicide concentrations, a daily concentration rate of 0.0011 mg/kg has been used as a conservative estimate.

This analysis assumes that berries are eaten raw, and that picloram and glyphosate residue levels are the same as 2,4-D residues. Adults are assumed to eat 0.25 kg per day, adolescent 0.13 kg per day, and infants 0.05 kg per day. The dosage estimates, including minor and major mixing errors, are presented in Table N-6. When 2,4-D is applied (minor mixing errors) at 3.6 lb ai/acre, an adult would receive a daily dose of 0.00098 mg/kg and an adolescent weighing 40 kg would receive a dose of 0.0007 mg/kg (eating 0.13 kg berries/day). It should be noted that in areas where noxious weed control

[illegible]

	Adult (70 kg)		Adolescent (40 kg)		Infant (10 kg)	
	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error
2,4-D						
Dermal (drift)						
500 feet	$1.2x10^{-4}$	$1.3x10^{-4}$	$1.5x10^{-4}$	$1.6x10^{-4}$	$2.8x10^{-4}$	$3.0x10^{-4}$
1/4 mile	$4.0x10^{-5}$	$4.3x10^{-5}$	$5.2x10^{-5}$	$5.6x10^{-5}$	$9.8x10^{-5}$	$1.0x10^{-4}$
1/2 mile	$1.8x10^{-5}$	$1.8x10^{-5}$	$2.1x10^{-5}$	$2.3x10^{-5}$	$3.9x10^{-5}$	$4.2x10^{-5}$
Oral Ingestion						
Water[1]	$4.3x10^{-3}$	$4.7x10^{-3}$	$2.2x10^{-3}$	$2.4x10^{-3}$	$1.1x10^{-3}$	$1.2x10^{-3}$
Meat[1]	$1.3x10^{-3}$	$1.4x10^{-3}$	$1.4x10^{-3}$	$1.5x10^{-3}$	$1.5x10^{-3}$	$1.7x10^{-3}$
Berries[2]	$9.8x10^{-4}$	$1.1x10^{-3}$	$8.9x10^{-4}$	$9.7x10^{-4}$	$1.1x10^{-3}$	$1.2x10^{-3}$
Picloram						
Dermal (drift)						
500 feet	$3.8x10^{-6}$	$4.1x10^{-6}$	$4.9x10^{-6}$	$5.2x10^{-6}$	$9.0x10^{-6}$	$9.6x10^{-6}$
1/4 mile	$1.3x10^{-6}$	$1.4x10^{-6}$	$1.5x10^{-6}$	$1.7x10^{-6}$	$3.0x10^{-6}$	$3.2x10^{-6}$
1/2 mile	$1.8x10^{-7}$	$5.0x10^{-7}$	$6.0x10^{-7}$	$7.0x10^{-7}$	$1.1x10^{-6}$	$1.2x10^{-6}$
Oral Ingestion						
Water[1]	$1.5x10^{-3}$	$1.6x10^{-3}$	$7.5x10^{-4}$	$8.0x10^{-4}$	$3.8x10^{-4}$	$4.0x10^{-4}$
Meat[1]	$4.3x10^{-4}$	$4.7x10^{-4}$	$4.5x10^{-4}$	$5.0x10^{-4}$	$5.0x10^{-4}$	$5.4x10^{-4}$
Berries[2]	$3.3x10^{-4}$	$3.6x10^{-4}$	$3.0x10^{-4}$	$3.2x10^{-4}$	$3.5x10^{-4}$	$3.8x10^{-4}$
2,4-Dichlorprop						
Dermal (drift)						
500 feet	$6.0x10^{-6}$	$6.4x10^{-6}$	$7.7x10^{-6}$	$8.2x10^{-6}$	$1.5x10^{-5}$	$1.6x10^{-5}$
1/4 mile	$2.0x10^{-6}$	$2.1x10^{-6}$	$2.8x10^{-6}$	$3.0x10^{-6}$	$5.2x10^{-6}$	$5.6x10^{-6}$
1/2 mile	$9.2x10^{-7}$	$9.8x10^{-7}$	$1.1x10^{-6}$	$1.2x10^{-6}$	$2.2x10^{-6}$	$2.4x10^{-6}$
Oral Ingestion						
Water[1]	$2.2x10^{-3}$	$2.4x10^{-3}$	$1.1x10^{-3}$	$1.2x10^{-3}$	$5.5x10^{-4}$	$6.1x10^{-4}$
Meat[1]	$5.6x10^{-4}$	$5.8x10^{-4}$	$6.7x10^{-4}$	$7.5x10^{-4}$	$7.5x10^{-4}$	$7.8x10^{-4}$
Berries[2]	$5.0x10^{-4}$	$5.3x10^{-4}$	$4.5x10^{-4}$	$4.8x10^{-4}$	$5.3x10^{-4}$	$5.7x10^{-4}$
Glyphosate						
Dermal (drift)						
500 feet	$1.2x10^{-4}$	$1.3x10^{-4}$	$1.5x10^{-4}$	$1.6x10^{-4}$	$2.8x10^{-4}$	$3.0x10^{-4}$
1/4 mile	$4.0x10^{-5}$	$4.3x10^{-5}$	$5.2x10^{-5}$	$5.6x10^{-5}$	$9.8x10^{-5}$	$1.0x10^{-4}$
1/2 mile	$1.8x10^{-5}$	$1.8x10^{-5}$	$2.1x10^{-5}$	$2.3x10^{-5}$	$3.9x10^{-5}$	$4.2x10^{-5}$
Oral Ingestion						
Water[1]	$4.3x10^{-3}$	$4.7x10^{-3}$	$2.2x10^{-3}$	$2.4x10^{-3}$	$1.1x10^{-3}$	$1.2x10^{-3}$
Meat[1]	$1.3x10^{-3}$	$1.4x10^{-3}$	$1.4x10^{-3}$	$1.5x10^{-3}$	$1.5x10^{-3}$	$1.7x10^{-3}$
Berries[2]	$9.8x10^{-4}$	$1.1x10^{-3}$	$8.9x10^{-4}$	$9.7x10^{-4}$	$1.1x10^{-3}$	$1.2x10^{-3}$

[1] Based on deposition rates 500 feet downwind from treated area.

[2] Based on deposition rates 100 feet off site.

projects are conducted, few berries would be found, except in recreation areas. Visitor exposure to herbicides through eating these foods would be voluntary, as recreational areas would be posted and accidental exposure should not occur. Also, recreation areas would be treated when recreation use days were minimal.

Several studies of herbicide residue in spray areas reveal that the herbicide dosage to persons reentering a spray area is likely to be small. Lavy and others (1980) reported that individuals who walked through an acre sprayed 2 hours earlier with 2,4,5-T had no detectable disiodgable residue levels on patches that represented dermal exposure to skin and clothing. Also, Thompson and others (1983) found that only 5 percent of 2,4-D applied to grasses could be removed by physically wiping immediately after spraying 1 to 2 lb ai/acre. These residues dropped to less than 1 percent within 5 days after application. This data shows that the exposure to herbicides from contacting treated foliage would be extremely small.

Review of Herbicide Toxicity and Comparisons

The toxic effects of a compound can be measured on any number of animal species using a variety of specific experimental protocol needed to provide a comprehensive picture of toxicity. The acute toxicity of a chemical compound is often indicated by the one-time or short-term dose that is lethal to 50 percent of a group of treated animals (LD_{50}). Because there is no universally accepted method for determining which animal species would provide the most suitable model for effects on man, the LD_{50} value for the species most sensitive to a particular herbicide (Table N-7) has been used. These values are based on a review of herbicide toxicological data provided by Sassman and others (1984).

Because lethality represents an extreme benchmark for judging possible effects from the use of herbicides, policies of regulating agencies regarding acceptable intake level for chemical compounds are most often based on toxicity tests designed to find the dose level that produces no effects on the most sensitive parameter in the animal species tested. This dose level is called the no observed effect level (NOEL). A NOEL can be determined from acute (single dose or short-term), subchronic (generally 30- to 90-day dosing studies), and chronic tests of a compound. All other things being equal, the longer the dosing duration upon which a NOEL is based for a particular species, the more reliable the resulting value.

In registering a herbicide for use on crops for human consumption or on animal foodstuffs subject to human consumption, EPA establishes tolerances for residues of herbicide on these foods. These tolerance levels are based on the toxicity data establishing NOELs and a projection of human consumption patterns. Generally, EPA uses the NOEL from the chronic dose studies with the species that is most sensitive to the compound. In the absence of chronic exposure test results with the most sensitive species, EPA allows the interim use of subchronic test results with the use of additional safety factors and the requirement of more chronic testing. As the amount and reliability of information increases, it is legitimate to use smaller safety factors, and conversly. Table N-7 provides NOEL data for the most sensitive species tested, as reviewed by EPA in setting tolerances for herbicide residues on human foodstuffs.

With the exception of picloram, all NOEL data provided in Table N-7 are based on 2-year feeding studies with either dogs or rats. The most recent tolerance limit determination for picloram by EPA was based on a 90-day dog-feeding study with a NOEL of 50 mg/kg/day. In the interim, Dow Chemical Company has been conducting more tests. A recently completed 6-month dog-feeding study showed a NOEL of 7 mg/kg/day (Roby 1984). Dow is currently conducting a 2-year rat-feeding study as reported by Roby (1984). Six- and 12-month interim data exist from these tests. At 6 months, some liver anomalies were noted in rats receiving doses of 60 mg/kg/day, but these effects were not noted in other rats after 12 months of daily doses of 60 mg/kg. At 20 mg/kg/day, no effects were noted for either 6- or 12-month dosing periods. Thus, 20 mg/kg/day is a conservative interim NOEL value for this worst-case analysis, but this analysis uses the more conservative (lower) NOEL of 7 mg/kg/day as determined by the 6-month dog study.

Table N-7. Summary of acute and chronic toxicity threshholds based on results from the most sensitive species

Herbicide	Acute oral[1] LD_{50} in mg/kg (micrograms/kg)	Chronic toxicity NOEL in mg/kg/day (micrograms/kg/day)	NOEL references
2,4-D	100 (100,000)	1 (1,000)	EPA 1985
Picloram	2,000 (2,000,000)	50 (50,000)	Fed. Register p. 41770
		20 (20,000)	Roby 1984
		7 (7,000)	Roby 1984
Glyphosate	4,320 (4,320,000)	30 (30,000)	EPA 1984k

[1] Based on review by Sassman and others 1984.

In this analysis, the dose to a hypothetical, maximally exposed individual is compared to the NOEL values for the herbicide in question. The maximally-exposed general population individual near ground vehicle projects is assumed to receive a dermal dose from drifting herbicides as well as an oral dose from the consumption of berries, water, and deer meat containing herbicide residues. Although the possibility is remote, a worker could receive high dosage levels on the job and also live near a spray site and be dosed through consumption of drift-contaminated berries or deer. Even with the considerable overestimation of the exposure and dose levels in these residential dose pathways, the incremental impact on a worker would be negligible. For example, the dosage (including major mixing errors) to a worker on a ground vehicle project using 2,4-D would be raised from 0.85 mg/kg/day to 0.86 mg/kg/day if the worker also eats deer meat and berries with herbicide residues as a resident near such projects.

Tables N-8 through N-10 provide comparison of occupational and maximum public exposure dosages with the NOEL values for each herbicide. The entry in each matrix element is the number by which a dose would have to be multiplied to equal the NOEL. Thus, this number represents a "margin of safety". For example, the margin of safety (MOS) of 111 for a pilot applying 2,4-D with minor mixing errors was calculated by dividing the NOEL value for 2,4-D (from Table N-7) by the dose (from Table N-5), (12 mg/kg/day)/(0.108 mg/kg/day). The pilot could have received 111 times as much 2,4-D exposure and still be within the safe level. No NOEL value for the 2,4-D/picloram mixture has been determined. The average of 2,4-D and picloram NOELs is 9.5 mg/kg/day; as a conservative estimate, we used 9 mg/kg/day in estimating exposures to this mixture. The use of an average NOEL figure probably over estimates exposure levels, in that it is low relative to 2,4-D, which constitutes two-thirds of the mixture (see maximum rate of application, Appendix H-2).

Backpack operations are high-exposure activities. Accordingly for this analysis, it was assumed that 2 applicators work only a half day each. Recognizing that this is a high-hazard occupational area, BLM requires stringent safety precautions and extraordinary mitigation measures.

For ground vehicle projects we have assumed that a full crew would be involved (driver, mixer-loader, and driver-mixer-loader). MOS values for these projects account for the predicted cumulative effects on an individual.

For aerial application projects, basically the same exposure levels would occur as with ground vehicle projects. Admittedly, because there is no handgun operator on aerial projects, exposure would be realistically less; the assumption that these two application methods are identical is conservative.

MOS values for occupational exposures (Table N-8) are considerably smaller than for the public exposure (Table N-9), reflecting more sustained and extensive herbicide contact by workers. The highest occupational hazard for the project types described would be to mixer-loaders in ground vehicle and aerial application projects. These activities are voluntary. Also, in the studies from which the base case dose data were derived, little protective equipment was used.

MOS values for the highest dosages (extraordinary) an individual might receive are given in Table N-10.

The entry in each matrix element is the NOEL divided by the sum of doses for hypothetical exposures of one individual. For example, the MOS of 1,412 for an adult getting direct dermal exposure for 2,4-D drift at 500 feet downwind of application and additional doses from oral ingestion was calculated by dividing the NOEL value for 2,4-D by the cumulative major mixing error dosages (12 mg/kg/day)/(0.00013 + 0.0047 + 0.0014 + 0.0011 mg/kg/day). MOS values for the public are for days of maximum exposure, which is generally the day of spraying. Since the dermal dose will only occur on the day of exposure, the MOS values for subsequent days involving only oral doses would be higher. MOS values for public dermal exposures are typically very high, often in excess of 500,000 particularly for picloram and 2,4-D/picloram mixture. Dose comparisons show that the public (through all age classes) would receive a dose that even remotely approaches the NOEL level only when they collect and consume relatively large amounts of sprayed berries, and water and deer meat containing herbicide residues. For numerous reasons these are very low probability events. Sprayed areas are not in locations which logically attract visitors seeking wild foods. The target noxious weeds (knapweed, leafy spurge, thistle etc.) are not in edible berry bushes and prime food habitats, and edible berries generally do not occupy noxious weed-infested areas. Nonetheless, the calculated extraordinary situation MOS values show that even when improbable events occur, health impacts would be highly unlikely with such a transient dose.

Table N-2. Margins of Safety [1] Based on Doses to Workers on Aerial and Ground Application Projects

	2,4-D		Picloram		2,4-D/picloram		Glyphosate	
	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors
Aerial								
Pilot	[illegible]	9	194	180	-	-	-	-
Mixer-loader	2	2	45	41	-	-	-	-
Supervisor	29	27	539	500	-	-	-	-
Observer	7	6	146	135	-	-	-	-
Ground Vehicle								
Driver	11	10	233	212	207	190	333	306
Mixer-loader	2	2	45	41	39	35	64	59
Driver-mixer-loader	2	2	38	36	32	29	54	50
Ground Hand								
Mixer-loader-applicator	5	4	97	90	83	75	139	128

[1] MOS = NOEL/exposure dose

Table N-3. Margins of Safety [1] Based on Doses to the Public in the Vicinity of Aerial and Ground Application Projects

	Adult		Adolescent		Infant	
	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors
2,4-D						
Dermal (drift)						
500 feet	8,333	7,692	6,667	6,250	3,571	3,333
1/4 mile	25,000	23,256	19,231	17,857	10,417	10,000
1/2 mile	62,500	55,556	47,619	43,478	25,641	23,810
Oral Ingestion						
Water[2]	233	213	455	417	909	833
Meat[2]	769	714	714	667	667	588
Berries[3]	1,020	938	1,124	1,031	909	833
Picloram						
Dermal (drift)						
500 feet	1,842,000	1,707,000	1,429,000	1,346,000	777,778	729,167
1/4 mile	5,385,000	5,000,000	4,667,000	4,118,000	2,333,000	2,188,000
1/2 mile	36,889,000	14,000,000	11,666,000	10,000,000	6,363,000	5,833,000
Oral Ingestion						
Water[2]	4,667	4,375	9,333	8,750	18,421	17,500
Meat[2]	16,279	14,894	15,560	14,000	14,000	12,963
Berries[3]	36,364	20,000	23,333	21,875	19,444	18,421
2,4-D/Picloram						
Dermal (drift)						
500 feet	150,000	140,625	116,883	109,756	60,000	56,250
1/4 mile	450,000	428,571	321,428	300,000	173,076	160,714
1/2 mile	978,260	918,367	818,181	750,000	409,000	375,000
Oral Ingestion						
Water[2]	4,090	3,750	8,180	7,500	16,364	14,754
Meat[2]	16,071	15,517	13,432	12,000	12,000	11,538
Berries[3]	18,000	16,981	20,000	18,750	16,667	15,789
Glyphosate						
Dermal (drift)						
500 feet	250,000	230,769	200,000	187,500	107,143	100,000
1/4 mile	750,000	697,674	576,923	535,714	312,500	300,000
1/2 mile	1,875,000	1,666,667	1,428,571	1,304,348	789,230	714,286
Oral Ingestion						
Water[2]	6,977	6,383	13,636	12,500	27,273	25,000
Meat[2]	23,077	21,429	21,429	20,000	20,000	17,647
Berries[3]	30,612	30,000	35,714	30,928	27,273	25,000

[1] MOS = NOEL/exposure dose

[2] Based on deposition rates 500 feet downwind of treated area

[3] Based on deposition rates 100 feet downwind of treated area

Actually, many doses, particularly the highest possible oral ingestion and the dermal doses from drift, would be of short duration (less than 1 day). By contrast, the NOEL values are based on long-term exposures. Realistically, a 1-day exposure, spread over an individuals lifetime (average = 25,550 days or 70 years), drastically reduces the probability of chronic effects and renders acute effects inconsequential. Thus, another safety factor is implied in the fact that a transient dose is compared to a long-term dose NOEL value. MOS values are given for activities in which both minor and major mixing errors are assumed. Provision of these assumptions again expresses conservatism.

A portion of the affected population may have abnormal sensitivity to herbicide exposures. A standard method of accounting for abnormal populations is to require an additional safety factor of 10. This was considered unneeded since public MOS values were sufficiently large, that even dividing by 10 would not bring them down to an unacceptable range.

Table N-10. Extraordinary Dose Margins of Safety[1] from Selected Exposures[2]

	Dermal and Oral Exposure[3] (Public)	Observer That Gets Dermal Drift (Occupational)	Ground Hand Applicator With Oral Exposure (Occupational)
2,4-D			
Adult	1,412	477	50
Adolescent	2,388	-	-
Infant	2,727	-	-
Picloram			
Adult	2,741	135	87
Adolescent	4,500	-	-
Infant	6,386	-	-
2,4-D/Picloram			
Adult	2,518	-	73
Adolescent	3,641	-	-
Infant	4,245	-	-
Glyphosate			
Adult	3,529	881	124
Adolescent	5,964	-	-
Infant	6,818	-	-

[1] MOS = NOEL/exposure dose.
[2] Dermal exposures at 500 feet from application. Oral exposure is ingestion of berries, water and meat.
[3] Assumes major mixing errors.

Incidence Levels of Cancer for Affected Populations from Differing Doses and Durations of Exposure

It is possible to calculate statistical upper limits on the carcinogenic potential of 2,4-D, utilizing multiple dosage data from Hansen and others (1971). The one-hit model was fit separately to male and female rat oncogenic data on total animals with tumors using the computer program GLOBAL82 (Howe and Crump 1982). The 2,4-D data on females gave the highest measure of cancer potency (the upper limit on the linear term in the one-hit model of cancer) based on 95 percent probability of occurrence. This upper limit was 3.01×10^{-4} ppm or 5.03×10^{-3} $(mg/kg/day)^{-1}$. Likewise, liver tumor data from picloram studies (National Cancer Institute 1978) were applied and the calculated upper limit for picloram is 3.40×10^{-5} ppm or 5.68×10^{-4} $mg/kg/day)^{-1}$. This value is approximately one tenth of the 2,4-D value. The value used for cancer potency of glyphosate is 2.4×10^{-5}.

With these cancer potency estimates, the probability of cancer over a life time as a result of differing lengths of exposure was determined using the following equation: $Pc = q^* \times D \times (De/L)$, where;

Pc = estimate of the probability of cancer

q^* = the upper limit of carcinogenic potency (ie., 2,4-D = 5.03×10^{-3}, picloram = 5.68×10^{-4}, and glyphosate = 2.4×10^{-5})

D = daily dose in mg/kg/day

De = number of days during which the daily dose occurs

L = number of days in a lifetime (25,550) for 70 years

Using the equation, the incremental chance of contacting cancer in a lifetime from each exposure pathway was calculated on the affected populations within each scenario outlined. Using the equation, the incremental chance of contacting cancer in a lifetime from each exposure pathway was calculated on the affected populations by varying the daily exposure dose and the number of days of dosing as appropriate for each scenario. The incidence levels are stated as mathematical probabilities.

Cancer probabilities for workers exposed during 1 year on the job are presented in Table N-11. This table shows that the lifetime chance of cancer occurring in a pilot spraying 2,4-D with major mixing errors would be $9.2\text{x}10^{-8}$. This probability of cancer incidence was derived from: Pc = $5.03\text{x}10^{-3}$ upper limit of carcinogenic potency x .117 mg/kg daily dose from Table N-5 x (4 days exposure from table N-1/25,550 days in a lifetime).

Cancer probabilities for individuals of the public exposed to 1-day of spraying are presented in Table N-12. Cancer probabilities for workers exposed over multiple years on the job are presented in Table N-13. In determining the number of exposure days, it was assumed that a worker stayed on the job performing the same type of project annually for 40 years.

Cancer probabilities for multiple public exposures (20 days) are presented in Table N-14. In determining the number of exposure days, it was assumed that a residence would receive drift from each side of a dwelling annually for 5 years(4 exposures annually for 5 years), resulting in 20 total exposure days to dermal exposure and also to ingestion of berries, water and meat.

The cancer incidence levels posited exponentially may be difficult to understand. From the example above, the chance of a pilot spraying 2,4-D contacting cancer is $9.2\text{x}10^{-8}$. This figure means that 9.2 pilots out of 100 million spraying 2,4-D for an annual program could contact cancer due to occupational exposure to 2,4-D. Similarity, 3.7 pilots out of one million spraying 2,4-D for 40 years could contact cancer.

Comparisons of Cancer Risks to Death From Involuntary Occurrence of Every Day Events

When cancer probability estimates are compared to everyday events, one can more easily assess the risk that may be found acceptable. Because working on a spraying crew is a voluntary activity, these duties will be related to both voluntary and unavoidable occurrences. The public probabilities will be related to natural, unavoidable occurrences, because exposure is assumed to be involuntary.

Table N-15 displays the probabilities of cancer occurring in members of the public from maximum exposure to 2,4-D, picloram, and glyphosate related to risks of natural, involuntary occurences. For example, the probability of an individual contacting cancer from a 5-year oral exposure to 2,4-D would be 4.3 chances in 1 billion ($4.3\text{x}10^{-9}$). The probability of contacting leukemia from eating 1 egg per day for the same period of time is much higher at 50 chances in 1 billion ($50\text{x}10^{-9}$). Similarly, there is a greater chance of being killed by meteorite (6 chances in 100 billion) than of getting cancer from 5 year drift exposure to picloram (1.8 chances in 1 trillion).

Table N-16 shows comparisons of selected voluntary exposures to workers and the occurrence of common events. For example, the cancer probability of a maximum exposed ground application crewmember working for 40 years with 2,4-D is 3.4 chances in 100,000 ($3.4\text{x}10^{-5}$). The chance of the same individual dying as a result of being run over by a vehicle is essentially the same at 5 chances in

Table N-11. Probability of Carcinogenic Effects from Extraordinary Dosages to Workers Exposed for a Single Season

	Occupational Exposure							
	2,4-D		Picloram		2,4-D/picloram		Glyphosate	
	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors
Aerial								
Pilot	$8.5\text{x}10^{-8}$	$9.2\text{x}10^{-8}$	$4.3\text{x}10^{-9}$	$5.2\text{x}10^{-9}$	-	-	-	-
Mixer-loader	$3.7\text{x}10^{-7}$	$4.0\text{x}10^{-7}$	$2.1\text{x}10^{-8}$	$2.3\text{x}10^{-8}$	-	-	-	-
Supervisor	$3.1\text{x}10^{-8}$	$3.4\text{x}10^{-8}$	$1.7\text{x}10^{-9}$	$1.9\text{x}10^{-9}$	-	-	-	-
Observer	$1.1\text{x}10^{-7}$	$1.2\text{x}10^{-7}$	$6.4\text{x}10^{-9}$	$6.9\text{x}10^{-9}$	-	-	-	-
Ground Vehicle								
Driver	$7.8\text{x}10^{-7}$	$8.5\text{x}10^{-7}$	$1.3\text{x}10^{-8}$	$1.4\text{x}10^{-8}$	$2.2\text{x}10^{-8}$	$2.3\text{x}10^{-8}$	$8.5\text{x}10^{-11}$	$9.2\text{x}10^{-11}$
Mixer-loader	$4.1\text{x}10^{-8}$	$4.4\text{x}10^{-8}$	$6.8\text{x}10^{-9}$	$7.3\text{x}10^{-9}$	$1.1\text{x}10^{-7}$	$1.2\text{x}10^{-7}$	$4.4\text{x}10^{-10}$	$4.8\text{x}10^{-10}$
Driver-mixer-loader	$4.8\text{x}10^{-8}$	$5.2\text{x}10^{-8}$	$8.1\text{x}10^{-9}$	$8.8\text{x}10^{-9}$	$1.4\text{x}10^{-7}$	$1.5\text{x}10^{-7}$	$5.2\text{x}10^{-10}$	$5.7\text{x}10^{-10}$
Ground Hand								
Mixer-loader-applicator	$3.6\text{x}10^{-7}$	$3.9\text{x}10^{-7}$	$1.0\text{x}10^{-8}$	$1.1\text{x}10^{-8}$	$1.5\text{x}10^{-8}$	$1.6\text{x}10^{-8}$	$2.0\text{x}10^{-10}$	$2.2\text{x}10^{-10}$

Table N-12. Probability of Carcinogenic Effects From Extraordinary Dosages to the Public Exposed for One Day

	Public Exposure					
	Adult (70 kg)		Adolescent (40 kg)		Infant (12 kg)	
	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error
2,4-D						
Dermal (drift)						
500 feet	2.4×10^{-11}	2.6×10^{-11}	3.0×10^{-11}	3.1×10^{-11}	5.5×10^{-11}	5.9×10^{-11}
1/4 mile	7.9×10^{-12}	8.5×10^{-12}	1.0×10^{-11}	1.1×10^{-11}	1.9×10^{-11}	2.0×10^{-11}
1/2 mile	3.1×10^{-12}	3.5×10^{-12}	4.1×10^{-12}	4.5×10^{-12}	7.7×10^{-12}	8.3×10^{-12}
Oral ingestion						
Water	8.5×10^{-10}	9.3×10^{-10}	4.3×10^{-10}	4.7×10^{-10}	2.2×10^{-10}	2.4×10^{-10}
Meat	2.6×10^{-10}	2.8×10^{-10}	2.8×10^{-10}	3.0×10^{-10}	3.0×10^{-10}	3.3×10^{-10}
Berries	1.9×10^{-10}	2.2×10^{-10}	1.6×10^{-10}	1.9×10^{-10}	2.2×10^{-10}	2.4×10^{-10}
Picloram						
Dermal (drift)						
500 feet	8.4×10^{-14}	9.1×10^{-14}	1.1×10^{-13}	1.2×10^{-13}	2.0×10^{-13}	2.1×10^{-13}
1/4 mile	2.5×10^{-14}	3.1×10^{-14}	3.3×10^{-14}	3.8×10^{-14}	6.7×10^{-14}	7.1×10^{-14}
1/2 mile	4.0×10^{-15}	1.1×10^{-14}	1.3×10^{-14}	1.6×10^{-14}	2.4×10^{-14}	2.7×10^{-14}
Oral ingestion						
Water	3.3×10^{-11}	3.6×10^{-11}	1.7×10^{-11}	1.8×10^{-11}	8.4×10^{-12}	8.9×10^{-12}
Meat	9.6×10^{-12}	1.0×10^{-11}	1.0×10^{-11}	1.1×10^{-11}	1.1×10^{-11}	1.2×10^{-11}
Berries	7.3×10^{-12}	7.8×10^{-12}	6.7×10^{-12}	7.1×10^{-12}	8.0×10^{-12}	8.4×10^{-12}
2,4-D/picloram mix						
Dermal (drift)						
500 feet	1.2×10^{-11}	1.3×10^{-11}	1.5×10^{-11}	1.6×10^{-11}	3.0×10^{-11}	3.1×10^{-11}
1/4 mile	3.9×10^{-12}	4.1×10^{-12}	5.5×10^{-12}	5.9×10^{-12}	1.0×10^{-11}	1.1×10^{-11}
1/2 mile	1.8×10^{-12}	1.9×10^{-12}	2.2×10^{-12}	2.4×10^{-12}	4.3×10^{-12}	4.7×10^{-12}
Oral ingestion						
Water	4.3×10^{-10}	4.7×10^{-10}	2.2×10^{-10}	2.4×10^{-10}	1.1×10^{-10}	1.2×10^{-10}
Meat	1.1×10^{-10}	1.1×10^{-10}	1.3×10^{-10}	1.5×10^{-10}	1.5×10^{-10}	1.5×10^{-10}
Berries	9.8×10^{-11}	1.0×10^{-10}	8.9×10^{-11}	9.4×10^{-11}	1.1×10^{-10}	1.1×10^{-10}
Glyphosate						
Dermal (drift)						
500 feet	1.1×10^{-13}	1.2×10^{-13}	1.4×10^{-13}	1.5×10^{-13}	2.6×10^{-13}	2.8×10^{-13}
1/4 mile	3.8×10^{-14}	4.0×10^{-14}	4.9×10^{-14}	5.3×10^{-14}	9.0×10^{-14}	9.4×10^{-14}
1/2 mile	1.5×10^{-14}	1.7×10^{-14}	2.0×10^{-14}	2.2×10^{-14}	3.7×10^{-14}	3.9×10^{-14}
Oral ingestion						
Water	4.0×10^{-12}	4.4×10^{-12}	2.1×10^{-12}	2.3×10^{-12}	1.0×10^{-12}	1.1×10^{-12}
Meat	1.2×10^{-12}	1.3×10^{-12}	1.3×10^{-12}	1.4×10^{-12}	1.4×10^{-12}	1.6×10^{-12}
Berries	9.2×10^{-13}	1.0×10^{-12}	8.4×10^{-13}	9.1×10^{-13}	1.0×10^{-12}	1.1×10^{-12}

100,000 ($5.0x10^{-5}$). Similarly, a maximum exposed pilot has a greater chance of being killed by firearms (2 chances in 1 million) than of getting cancer from working with picloram for 40 years (2.1 chances in 10 million).

Likelihood of the Worst-Case Occurring

This analysis has over stated the possible effects throughout in estimating the extent of occupational and public exposure to 2,4-D and picloram as proposed under the Proposed Action. The analysis has overstated actual practices and conditions, assumed that simultaneous occurrence of these values would happen, and furthermore has used the one-hit theory of carcinogencity. The situations presented for public exposures are hypothetical and are highly unlikely to occur in actual practice. The margins of safety based on no effect levels, are extremely high for public exposure. Even with built-in conservatism, the doses and resulting cancer probabilities would be extremely rare events. Comparisons to cancer causing potential of common place events based on actual statistics, emphasize this fact.

Occupational exposure dosages are naturally higher than the public exposure dosages. However, the MOS values for ground application crews (the maximum exposed workers) still average 60 times higher than the no effect levels. The cancer probabilities, established with much conservatism, are comparable to everyday mortalities from such hazards as home fires.

Table N-13. Probability of Carcinogenic Effects from Extraordinary Dosages to Workers Exposed for a 40-year Working Lifetime

	Occupational Exposure							
	2,4-D		Picloram		2,4-D/picloram		Glyphosate	
	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors	Minor Mix Errors	Major Mix Errors
Aerial								
Pilot	$3.4x10^{-6}$	$3.7x10^{-6}$	$1.9x10^{-7}$	$2.1x10^{-7}$	—	—	—	—
Mixer loader	$1.5x10^{-5}$	$1.6x10^{-5}$	$8.3x10^{-7}$	$9.0x10^{-7}$	—	—	—	—
Supervisor	$1.3x10^{-6}$	$1.4x10^{-6}$	$6.9x10^{-8}$	$7.5x10^{-8}$	—	—	—	—
Observer	$4.5x10^{-6}$	$4.9x10^{-6}$	$2.6x10^{-7}$	$2.8x10^{-7}$	—	—	—	—
Ground Vehicle								
Driver	$3.1x10^{-5}$	$3.4x10^{-5}$	$5.2x10^{-7}$	$5.7x10^{-7}$	$8.7x10^{-7}$	$9.4x10^{-7}$	$3.4x10^{-9}$	$3.7x10^{-9}$
Mixer-loader	$1.6x10^{-4}$	$1.8x10^{-4}$	$2.7x10^{-6}$	$2.9x10^{-6}$	$4.5x10^{-6}$	$4.9x10^{-6}$	$1.8x10^{-8}$	$1.9x10^{-8}$
Driver-mixer-loader	$1.9x10^{-4}$	$2.1x10^{-4}$	$3.2x10^{-6}$	$3.5x10^{-6}$	$5.4x10^{-6}$	$5.9x10^{-6}$	$2.1x10^{-8}$	$2.3x10^{-8}$
Ground Hand								
Mixer-loader-applicator	$1.4x10^{-5}$	$1.6x10^{-5}$	$4.2x10^{-7}$	$4.5x10^{-7}$	$6.0x10^{-7}$	$6.5x10^{-7}$	$8.1x10^{-9}$	$8.8x10^{-9}$

Table N-14. Probability of Carcinogenic Effects from Extraordinary Dosages to the Public Exposed for 20-Days[1]

	Public Exposure					
	Adult (70 kg)		Adolescent (40 kg)		Infant (12 kg)	
	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error	Minor Mix Error	Major Mix Error
2,4-D						
Dermal (drift)						
500 feet	4.7×10^{-10}	5.1×10^{-10}	5.9×10^{-10}	6.3×10^{-10}	1.1×10^{-9}	1.2×10^{-9}
1/4 mile	1.6×10^{-10}	1.7×10^{-10}	2.0×10^{-10}	2.2×10^{-10}	3.5×10^{-10}	3.9×10^{-10}
1/2 mile	6.3×10^{-11}	7.1×10^{-11}	8.3×10^{-11}	9.1×10^{-11}	1.5×10^{-10}	1.7×10^{-10}
Oral ingestion						
Water	1.7×10^{-8}	1.9×10^{-8}	8.7×10^{-9}	9.4×10^{-9}	4.3×10^{-9}	4.7×10^{-9}
Meat	5.1×10^{-9}	5.5×10^{-9}	5.5×10^{-9}	5.9×10^{-9}	5.9×10^{-9}	6.7×10^{-9}
Berries	3.9×10^{-9}	4.3×10^{-9}	3.5×10^{-9}	3.8×10^{-9}	4.3×10^{-9}	4.7×10^{-9}
Picloram						
Dermal (drift)						
500 feet	1.7×10^{-12}	1.8×10^{-12}	2.2×10^{-12}	2.3×10^{-12}	4.0×10^{-12}	4.3×10^{-12}
1/4 mile	5.8×10^{-13}	6.2×10^{-13}	6.7×10^{-13}	7.6×10^{-13}	1.3×10^{-12}	1.4×10^{-12}
1/2 mile	8.0×10^{-14}	2.2×10^{-13}	2.7×10^{-13}	3.1×10^{-13}	4.9×10^{-13}	5.3×10^{-13}
Oral Ingestion						
Water	6.7×10^{-10}	7.1×10^{-10}	3.3×10^{-10}	3.6×10^{-10}	1.7×10^{-10}	1.8×10^{-10}
Meat	1.9×10^{-10}	2.1×10^{-10}	2.0×10^{-10}	2.2×10^{-10}	2.2×10^{-10}	2.4×10^{-10}
Berries	1.5×10^{-10}	1.6×10^{-10}	1.3×10^{-10}	1.4×10^{-10}	1.6×10^{-10}	1.7×10^{-10}
2,4-D/picloram						
Dermal (drift)						
500 feet	2.4×10^{-10}	2.5×10^{-10}	3.0×10^{-10}	3.2×10^{-10}	5.9×10^{-10}	6.3×10^{-10}
1/4 mile	7.9×10^{-11}	8.3×10^{-11}	1.1×10^{-10}	1.2×10^{-10}	2.0×10^{-10}	2.2×10^{-10}
1/2 mile	3.6×10^{-11}	3.9×10^{-11}	4.3×10^{-11}	4.7×10^{-11}	8.7×10^{-11}	9.4×10^{-11}
Oral Ingestion						
Water	8.7×10^{-9}	9.4×10^{-9}	4.3×10^{-9}	4.7×10^{-9}	2.2×10^{-9}	2.4×10^{-9}
Meat	2.2×10^{-9}	2.3×10^{-9}	2.6×10^{-9}	3.0×10^{-9}	3.0×10^{-9}	3.1×10^{-9}
Berries	2.0×10^{-9}	2.1×10^{-9}	1.8×10^{-9}	1.9×10^{-9}	2.1×10^{-9}	2.2×10^{-19}
Glyphosate						
Dermal (drift)						
500 feet	2.3×10^{-12}	2.4×10^{-12}	2.8×10^{-12}	3.0×10^{-12}	5.3×10^{-12}	5.6×10^{-12}
1/4 mile	7.5×10^{-13}	8.1×10^{-13}	9.8×10^{-13}	1.1×10^{-12}	1.8×10^{-12}	1.9×10^{-12}
1/2 mile	3.0×10^{-13}	3.4×10^{-13}	3.9×10^{-13}	4.3×10^{-13}	7.3×10^{-13}	7.9×10^{-13}
Oral Ingestion						
Water	8.1×10^{-11}	8.8×10^{-11}	4.1×10^{-11}	4.5×10^{-11}	2.1×10^{-11}	2.3×10^{-11}
Meat	2.4×10^{-11}	2.6×10^{-11}	2.6×10^{-11}	2.8×10^{-11}	2.8×10^{-11}	3.2×10^{-11}
Berries	1.8×10^{-11}	2.1×10^{-11}	1.7×10^{-11}	1.8×10^{-11}	2.1×10^{-11}	2.3×10^{-11}

[1] Four exposure days a year for 5 years.

Table N-15. Selected High Probabilities of Cancer in the Adult Population from Involuntary Occurences Compared to Hazards from Rare Occurrences

Occurrences	Involuntary Probability	Probability from Major Error/5-year Exposure	
		2,4-D	
-Death from living in a brick house (radon)	40×10^{-9}	5.1×10^{-10}	Drift
-Leukemia from eating 1 egg/day (Benzene)	50×10^{-9}	4.3×10^{-9}	Oral
		Picloram	
-Probability of death from being killed by a meterorite (none yet recorded)	6×10^{-11}	1.8×10^{-12} 1.6×10^{-10}	Drift Oral
		Glyphosate	
-Death from lightning strike	1×10^{-7}	8.8×10^{-11}	Oral

Sources: Goldman (1984) and Crouch and Wilson (1982).

Table N-16. Selected High Probabilities of Adult Cancer in Workers Compared to Probabilities of Death from Everday Occurrences

Everyday Activities Resulting in Mortality	Probability of Occurrence	Voluntary Applicator Probability Major Error - 40 Year Exposure
		2,4-D
-Drinking water in New York City or Miami	1.2×10^{-6}	
-Falls in public places	1.9×10^{-6}	Aerial 1.6×10^{-5}
-Electrocution	5.3×10^{-6}	
-Fires in Home	2.1×10^{-6}	Ground 3.4×10^{-5}
-Run over by a Vehicle	5.0×10^{-5}	
		Picloram
-Eating a half pound broiled steak per week	3.0×10^{-7}	
-Firearms (accidental)	2.0×10^{-6}	Aerial 2.1×10^{-7}
-Bladder cancer from sacchrin (1 soft drink/day)	1.7×10^{-6}	Ground 2.9×10^{-6}
		Glyphosate
-Drinking 1 pt. milk/day	2.0×10^{-6}	Ground 1.8×10^{-8}

Sources: Crouch and Wilson (1982) and Goldman (1984).

Accidental Spill Scenarios

In the event of an accident, workers or members of the general public could be exposed to much greater amounts of herbicide than they would under routine operational conditions. Accident scenarios were used to estimate the extreme doses that would result from these exposures. The scenarios are not intended to show what necessarily will happen as a result of a given treatment operation, but what could happen when all of the conditions specified in the scenario are met in the actual operation. For example, worker doses are based on dose levels found in field exposure studies in which no protective clothing or equipment was worn. Doses would be significantly lower than those estimated here since workers are required to wear protective clothing and equipment during actual operations. There is no question that workers would be present and would be subjected to some level of exposure in treatment operations.

The two scenarios used in this analysis are:

> Scenario No. 1—Workers spilling concentrate or prepared spray mixture on their skin during mixing, loading, or backpack spraying operations; or being doused when a transfer hose breaks.
>
> A person's dermally absorbed dose would depend on the concentration of herbicide in the spray mix, the area of exposed skin, the extent to which the person's clothing absorbed herbicide (that would either dry in place or penetrate to the skin), and the length of time between the accidental exposure and the person's washing up. Indirect dermal exposure could occur when workers or members of the general public brush up against wet vegetation in the sprayed site, but this exposure would be less than that of the applicator drenched when a hose breaks. As a conservative approach, indirect dermal exposure will be considered the same as direct dermal exposure.
>
> Scenario No. 2—Members of the public receiving herbicide exposure via drinking water when a herbicide load is jettisoned or when a container of herbicide mixture breaks open and spills into a drinking water supply.
>
> Members of the public could be exposed from a herbicide load being jettisoned or from a container of herbicide mixture being ruptured and spilled into a drinking water supply. For example, a helicopter could jettison its load of herbicide for safety reasons (to maintain aircraft stability) or accidentally through pilot error.
>
> Such a spill would, in most instances, result in localized damage to the environment, causing a small area of plant kill, but with no toxic effects to humans. However, in the extremely unlikely event that a person was standing where the jettisoned load fell, there could be toxic effects, depending on the inherent toxicity of the herbicide and the concentration of herbicide in the spray mix, in addition to the effects of the physical impact of such a dump of liquid on the person.

All doses estimated in this accidental exposure analysis were calculated for a representative 50-kg person. This weight was chosen to represent an adult of less than average weight, so that doses to adults would be calculated in a conservative manner. (Doses for a larger person would be less in terms of mg per kg of body weight.)

Herbicides are packaged and sold by the manufacturer in liquid form as a concentrate with a specified number of pounds of active ingredient, usually between 1 and 4 pounds per gallon of concentrate.

A 1000 gallon tank on a truck for ground vehicle application is used for analysis; this exceeds the maximum size normally used in the noxious weed control program. Also the impact of a helicopter crash into a reservoir is calculated assuming a 70 gallon tank which is the normal size tank for a small agricultural helicopter ordinarily involved in this type program.

The maximum herbicide concentrations in helicopters and batch trucks are summarized in Table N-17.

Before herbicides are applied they would be mixed with water (the carrier), according to the manufacturer's label instructions for the particular treatment purpose and the desired application rate in pounds of active ingredient per acre. The concentrate is normally mixed with 5 to 15 gallons of water for every acre to be treated in aerial applications and with 50 to 100 gallons of water for every acre to be treated in ground applications. To obtain the highest concentration in doses, the lowest figures in gallons per acre is used. Herbicide stored in 30 to 55 gallon drums as concentrate is prepared for application and transferred to application equipment by a mixer/loader who uses a batch truck that has separate storage tanks for the carrier and for the herbicide mixture.

Direct dermal exposures were calculated for spills of 0.5 liter of herbicide concentrate (if liquid concentrates are used) or 0.5 liter of the most concentrated spray mixture. It was assumed that the person exposed during the spill weighs 50 kg, and most of their surface area (0.8 m² or 8.6 ft²) is thoroughly wetted by the solution. Denim fabric commonly used in clothing retains about 57.5 ml of solution per square foot (Weeks, 1985). However, to be conservative it was assumed that 20 percent of the solution would wet bare skin. A spill resulting in this much exposure could result from broken hoses, spilled containers, or emergency and accidental dumps by helicopters. It was also assumed that no additional washing occurred. The dermal penetration rates used in this study were 10 percent for 2,4-D, 1 percent for picloram, and 10 percent for glyphosate, as discussed earlier.

To analyze the impacts of major spills into ponds and reservoirs, the size of the water body must be assumed. Small ponds and reservoirs are used for a conservative approach since the herbicide concentration would be greater than in a larger water body. The pond is assumed to be 1 acre in size by 4 feet deep which converts to approximately 1,306,000 gallons total. The reservoir is assumed to be 30 acres with an average depth of 10 feet. Total mixing of the spill in the waters and that someone would drink 1 liter before being alerted to the spill, are assumed. The herbicide is also assumed to remain at full strength, not allowing for chemical degradation or absorption by either sediment or organic matter in the water.

An individual could receive an accidental ingestion exposure by drinking water contaminated by a jettison of 70 gallons of herbicide mix as from a helicopter, or 1000 gallons of herbicide mix spilled from a batch truck accident.

Doses from accidental spills, both dermal and via drinking water, are presented in Table N-18. By far, the highest doses would be received by a worker spilling a sufficient amount of herbicide concentrate on the skin.

Risks to Workers and the Public from Accidental Exposure

To qualify these risks of threshold effects, the doses estimated for exposed individuals are compared to laboratory derived no-observed-effect levels (NOEL's) determined in the most sensitive animal test species. For doses that are not likely to occur more than once (such as those received by workers spilling 0.5 liter of spray mix over their entire upper body), a dose estimate that exceeds the laboratory test animal NOEL does not necessarily lead to the conclusion that there would be chronic toxic effects because all NOELs are based on (or take into account) long-term multiple exposures. As evidenced by the probabilities of chronic effects shown in Tables N-11 through N-14, the greater number of exposures resulting in doses leads to a higher probability of effects. An estimated dose which exceeds the test animal NOEL is compared to the herbicide's LD_{50} value which provides information on the risk of acute effects.

The ratio between the animal NOEL and the estimated human dose, referred to in this worst-case analysis as the margin of safety (MOS), is used to account for the uncertainty inherent in relating doses and effects seen in animals to doses and effects seen in humans. A MOS value of 100 means the laboratory-determined level is one-hundred times higher than the estimated dose. For convenience in this analysis, the ratio between the herbicide's LD_{50} and the estimated human dose is expressed as a MOS value also, however, it should not be construed as having the same significance in terms of the expectation of no effects in humans as the ratio based on the NOEL.

The larger the MOS value (the smaller the estimated human dose compared to the animal NOEL) the lower the risk to human health. In an instance where an estimated dose exceeds a NOEL (giving a MOS value less than one) the ratio is reversed (the dose is divided by the NOEL) to indicate how high the estimated dose is above the

Table N-17. Maximum Herbicide Concentrations in Helicopters and Batch Trucks

Chemical	Pounds [1] Applied Per Acre	Pounds [1] Per Gallon of Concentrate	Pounds [1] Per 70 Gal Helicopter	Pounds [1] 1000 Gallon Ground Vehicle
2,4-D	3	4	42	60
Picloram	1	2	14	20
Glyphosate [2]	3	3	-	60

[1] Pounds of active ingredient (a.i.)

[2] Not proposed for aerial

laboratory toxicity level, and a minus sign is attached to indicate that the dose exceeded the NOEL. A ratio of -3, for example, means that the estimated dose is three times the laboratory-determined level. A negative ratio infers that the estimated dose (given all the assumptions of the scenario) represents a clear risk of possible acute effects when the ratio is based on the LD_{50} or of possible chronic effects when the ratio is based on the systemic or reproductive NOEL.

Tables N-19 through N-21 present the margin of safety values for worker and public accidental exposure to the herbicides 2,4-D, picloram, and glyphosate.

Table N-18. Workers and Public Doses from Exposure to Herbicide Spills

	Exposures Per Lifetime [1]	Herbicide Dose in mg/kg		
		2,4-D	Picloram	Glyphosate
Spills onto Skin (0.5 liter)				
Concentrate [2]	1	94	4.8	72
Spray Mix (Aerial)	1	14	0.48	–
Spray Mix (Ground)	1	1.4	0.04	1.4
Spills into Water (1 liter consumed)				
Pond, Helo	1	0.076	0.025	–
Reservoir, Helo	1	0.001	0.00034	–
Pond, Truck	1	0.11	0.036	0.11
Reservoir, Truck	1	0.0015	0.00048	0.0015

[1] Based on BLM's (not including Forest Service data) past ratio of such accidents to total acres treated, it is highly unlikely that any worker or member of the public would be exposed more than once in a lifetime to an accident as described in this section.

[2] Herbicide concentrate spills onto the skin should occur only to a worker.

Table N-19. Margins of Safety for Doses Due to Spills of 2,4-D

		Margin of Safety Relative to		
	Exposure (mg/kg/day)	Acute LD_{50} (375)	Systemic NOEL (1)	Reproductive NOEL (25)
Spills onto Skin (0.5 liter)				
Concentrate	94	4	-94	-3.8
Spray Mix (Aerial)	14	27	-14	1.8
Spray Mix (Ground)	1.4	268	-1.4	18
Spills into Water (1 liter consumed)				
Pond, Helo	0.076	4,934	13	329
Reservoir, Helo	0.001	10,000+	1,000	10,000+
Pond, Truck	0.11	3,409	9	227
Reservoir, Truck	0.0015	10,000+	667	10,000+

Table N-20. Margins of Safety for Doses Due to Spills of Picloram

	Exposure (mg/kg/day)	Margin of Safety Relative to		
		Acute LD_{50} (8200)	Systemic NOEL (7)	Reproductive NOEL (50)
Spills onto Skin (0.5 liter)				
Concentrate	4.8	1,708	1.5	10
Spray Mix (Aerial)	0.48	10,000 +	15	104
Spray Mix (Ground)	0.04	10,000 +	175	1,250
Spills into Water (1 liter consumed)				
Pond, Helo.	0.025	10,000 +	280	2,000
Reservoir, Helo	0.00034	10,000 +	10,000 +	10,000 +
Pond, Truck	0.036	10,000 +	194	1,389
Reservoir, Truck	0.00048	10,000 +	10,000 +	10,000 +

Table N-21. Margins of Safety for Doses Due to Spills of Glyphosate[1]

	Exposure (mg/kg/day)	Margin of Safety Relative to		
		Acute LD_{50} (4320)	Systemic NOEL (30)	Reproductive NOEL (10)
Spills onto Skin (0.5 liter)				
Concentrate	72	60	-2.4	-7.2
Spray Mix (Aerial)	--	--	--	--
Spray Mix (Ground)	1.4	3,086	21	7.1
Spills into Water (1 Liter Consumed)				
Pond, Helo	--	--	--	--
Reservoir, Helo	--	--	--	--
Pond, Truck	0.11	10,000 +	273	91
Reservoir, Truck	0.0015	10,000 +	10,000 +	6,667

[1] The herbicide glyphosate is not proposed for aerial application.

Incidence Levels of Cancer for Accidental Exposure to Herbicide Spills

Cancer risks calculated for exposures to accidental herbicide spills are shown in Table N-22. The greatest risks among the three chemicals are for a spill of 2,4-D concentrate onto the skin. The greatest risks are for spills of herbicide concentrate directly onto clothing and skin. Workers are at the greatest risk for this type of accident. The tabled values assume that at least 20 percent of a person's skin has been contacted by the solution, and cleanup does not occur for several hours. This is certainly contrary to standard practice. A concentrate spill of 2,4-D onto a person gives a cancer risk of about 2 in 100,000 such incidents, and a spill of spray mixture (aerial) gives a risk of about 3 in 1,000,000. A spill of picloram concentrate gives a risk of about 1 in 10 million, and for picloram mixture (aerial) about 1 in 100 million. Cancer risks arising from major spills into drinking water supplies are significantly less. A 70-gallon helicopter load of 2,4-D spray mixture dumped into a pond would lead to a risk of cancer of less than 2 in 100 million for a person drinking a liter of the water. The corresponding risks for the other chemicals are orders of magnitude less. The risk of cancer from 2,4-D would be about 2 in 100 million for a spill of a 1,000-gallon tank truck of spray mixture into a small pond.

Table N-22. Probability of Carcinogenic Effects from Exposure to Herbicide Spills for Workers and Public

	2,4-D	Picloram	Glyphosate[1]
Spills onto Skin (0.5 liter)			
Concentrate[2]	1.8×10^{-5}	1.1×10^{-7}	6.7×10^{-9}
Spray Mix (Aerial)	2.7×10^{-8}	1.1×10^{-8}	—
Spray Mix (Ground)	2.7×10^{-7}	9.0×10^{-10}	1.3×10^{-9}
Spills into Water (1 liter consumed)			
Pond, Helo	1.5×10^{-8}	8.0×10^{-10}	—
Reservoir, Helo	2.0×10^{-10}	7.5×10^{-12}	—
Pond, Truck	2.2×10^{-8}	8.0×10^{-10}	1.0×10^{-10}
Reservoir, Truck	3.0×10^{-10}	1.1×10^{-11}	1.4×10^{-12}

[1] Glyphosate is not proposed for aerial application.

[2] Herbicide concentrate spills onto the skin should occur only to a worker.

Probability of Accidental Exposure

Herbicide spill accidents recorded by BLM and the Forest Service were classified by location, date, and quantity spilled. Also included was information specifying the occurrence of accidents on ground or in the air, and if the spill was near a waterway. Over an 11-year period, from 1973 through 1983, there were 24 recorded spills averaging 44.4 gallons per accident. Herbicide use rates ranged from 1.5 lb. active ingredient (a.i.) to 7 lb. a.i. per acre for normal use rates. For a total of 302,085 acres sprayed during the 11-year period there was one accident for every 12,589 acres and 54% of the spills involved 30 gallons or less. Applying this past accident ratio to the proposed herbicide use level for noxious weed control, as many as 1.7 accidents (on the average) could occur per year (22,000 acres÷13,000 acres).

Comparison of Cancer Risks with Other Common Risks

Comparison of cancer risks from accidental exposure (Table N-22) to familiar hazards and occupational risks listed in Table N-16 provides a good perspective of the risk. According to Crouch and Wilson (1982), motor vehicle accidents have a fatality risk that averages 2 in 10,000 persons each year. Over a person's 30-year period of vehicular travel the cumulative fatality risk is 6 in 1,000 from car accidents. A variety of hazards are listed in the table that have a fatality risk of about 1 in 1 million. These include smoking 2 cigarettes, eating 6 pounds of peanut butter, drinking 40 sodas sweetened with saccharin, or taking one transcontinental round trip by air. The cancer risk from having a single x-ray taken is 7 in 1 million people. Many occupational risks are greater. Working for 30 years in agriculture or construction has a fatality risk of about 2 in 100 and in mining and quarrying the risk is even greater, estimated to be 3 in 100.

[illegible]

[illegible]

Appendix O
Herbicide Labels

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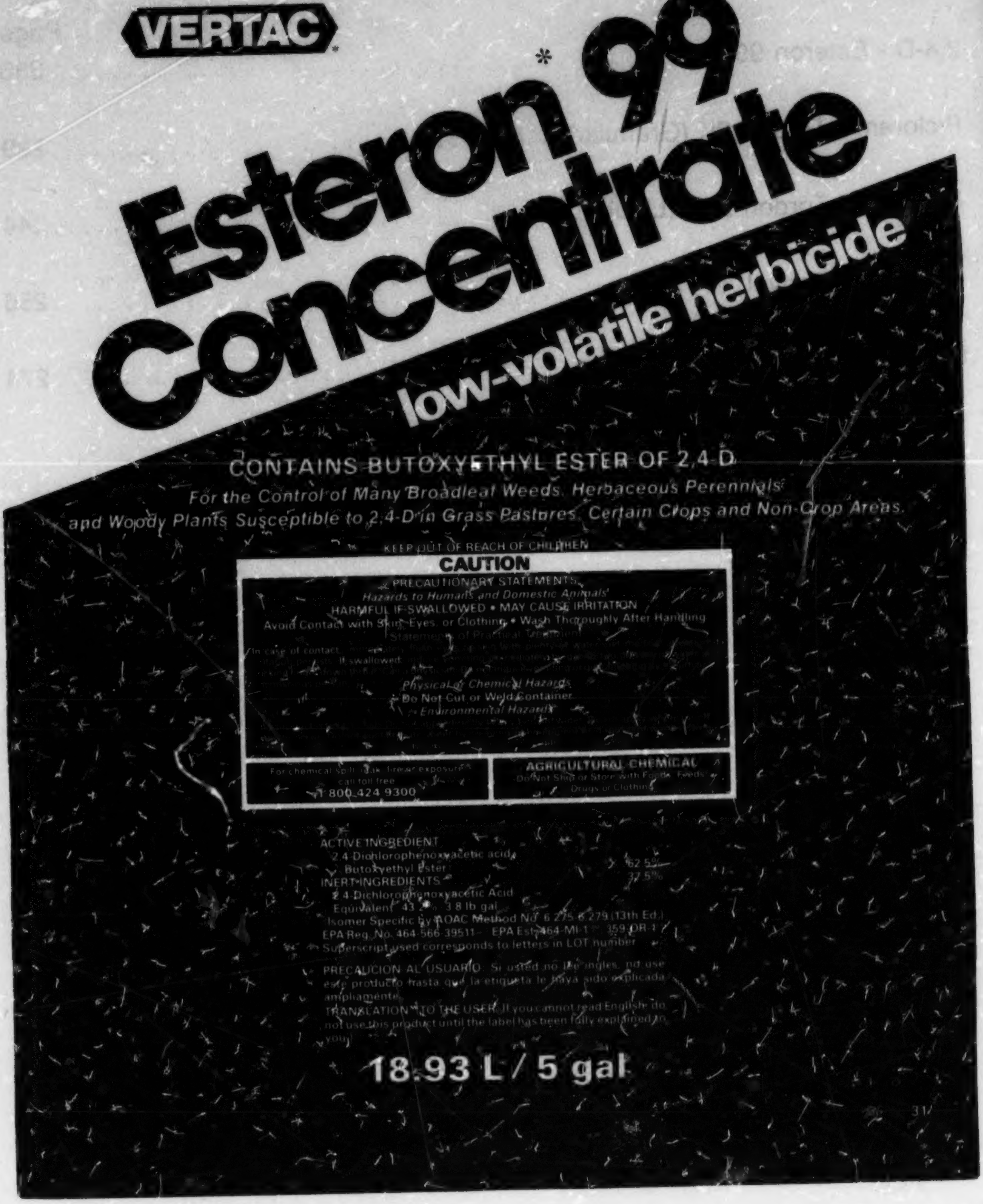
2,4-D - Esteron 99 236

Picloram - Tordon 2K (Granular) 239

Picloram - Tordon 22K (Liquid) 244

Dicamba - Banvel 256

Glyphosate - Rodeo 274



VERTAC

Esteron 99* Concentrate*

low-volatile herbicide

CONTAINS BUTOXYETHYL ESTER OF 2,4-D

For the Control of Many Broadleaf Weeds, Herbaceous Perennials and Woody Plants Susceptible to 2,4-D in Grass Pastures, Certain Crops and Non-Crop Areas.

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

HARMFUL IF SWALLOWED • MAY CAUSE IRRITATION

Avoid Contact with Skin, Eyes, or Clothing • Wash Thoroughly After Handling

Statement of Practical Treatment

In case of contact, [illegible] If swallowed: [illegible]

Physical or Chemical Hazards

Do Not Cut or Weld Container

Environmental Hazards

[illegible]

For chemical spill, leak, fire or exposure
call toll free
1-800-424-9300

AGRICULTURAL CHEMICAL
Do Not Ship or Store with Foods, Feeds,
Drugs or Clothing

ACTIVE INGREDIENT	
2,4-Dichlorophenoxyacetic acid, Butoxyethyl Ester	62.5%
INERT INGREDIENTS	37.5%

2,4-Dichlorophenoxyacetic Acid Equivalent: 43.2% - 3.8 lb/gal
Isomer Specific by AOAC Method No. 6.275-6.279 (13th Ed.)
EPA Reg. No. 464-566-39511   EPA Est. 464-MI-1   359-OR-1
Superscript used corresponds to letters in LOT number

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

TRANSLATION TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.

18.93 L / 5 gal

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WEED LIST

ESTERON 99 Concentrate herbicide is recommended for control of numerous broadleaf weeds and certain 2,4-D susceptible woody plants without injury to most established grasses. Species controlled include the following, plus many others:

beggarticks • bitterweed • blueweed, Texas • broomweed • buckbrush • buckwheat, wild • burdock • burhead • carpetweed • catnip • chamise • chicory • cocklebur • coffeeweed • cornflower • coyotebrush • croton • dandelion • docks • dogfennel • elderberry • galinsoga • garlic, wild • goatsbeard • halogeton • hemp, wild • jewelweed • jimsonweed • ladysthumb • lambsquarter • loco, bigbend • mallow, Venice • manzanita • marshelder • milkvetch • morningglory, annual • nettles • onion, wild • pennycress (fanweed) • pepperweed, field • pigweed†† • plantains • poorjoe • rabbitbrush • radish, wild • ragweed • rape, wild • redstem • sage, coastal • sagebrush, big • sagebrush, sand • salsify • sand shinnery oak • shepherdspurse • sicklepod • smartweed (annual) • sneezeweed, bitter • sowthistle, annual • spanishneedles • sumac • sunflower • sweetclover • tansyragwort • thistle, bull • thistle, musk • thistle, Russian • tumbleweed • velvetleaf • vervains • vetch • water plantain • wild mustard • willow • witchweed • wormwood • yellow rocket • yellow starthistle

††The control of "hybrid" pigweeds appears to be less satisfactory from 2,4-D products than formerly experienced on "non-hybrid" varieties. Since 2,4-D herbicides are not as effective on the "hybrid" pigweeds, it is necessary to apply higher rates of 2,4-D for control, especially later in the growing season. Higher rates injure some crops, so less than satisfactory pigweed control may be experienced by the highest tolerated crop dosages.

Therefore, The Vertac Chemical Corporation does not include pigweed among the species covered by the performance guarantee statements on the labels for ESTERON 99 Concentrate herbicide. At this time, this disclaimer applies only to the High Plains of Texas and western Oklahoma, including the Panhandles. All other guarantees on these product labels are unchanged by this disclaimer.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Apply ESTERON 99 Concentrate herbicide as water or oil spray during warm weather when weeds or brush are actively growing. Application under drought conditions often will give poor results. Use low spray pressure to minimize drift. On cropland and along roadsides, do not exceed 20 psi pressure. Apply enough spray volume to provide uniform coverage of weeds and brush, usually 5 to 20 gallons per acre by ground equipment and 3 to 5 gallons by aircraft. Higher gallonage may be used if desired to improve spray coverage. Generally, the lower dosages recommended on this label will be satisfactory for young, succulent growth of sensitive weed species. For less sensitive species and under conditions where control is more difficult, the higher dosages will be needed. For crop uses, do not mix with oil or other adjuvants unless specifically recommended on this label. Deep-rooted perennial weeds such as Canada thistle and field bindweed and many woody plants usually require repeated applications for maximum control. **Do not apply ESTERON 99 Concentrate where spray drift may contact nearby susceptible crops or other desirable plants or may contaminate water for irrigation or domestic use. Read and follow all Use Precautions given on this label.**

NOTE: If there are uncertainties concerning special local use situations or specific crop variety tolerances to 2,4-D, consult your State Agricultural Experiment Station or local Extension Service weed specialists for advice.

TO PREPARE THE SPRAY: (1) Fill the spray tank about half full with water, then add the required amount of ESTERON 99 Concentrate, with agitation, and finally the rest of the water. NOTE: ESTERON 99 Concentrate in water forms an emulsion which tends to separate unless the mixture is kept agitated. (2) If oil is added, first mix the ESTERON 99 Concentrate and the oil and then add this mixture to the water. However, with adequate agitation, the oil can be added after the ESTERON 99 Concentrate is mixed in the water. (3) If straight oil is used, a solution is formed and separation does not occur. Do not allow any water to get into the oil-herbicide mixture to avoid formation of an invert emulsion.

USE IN LIQUID NITROGEN FERTILIZER: ESTERON 99 Concentrate may be combined with liquid nitrogen fertilizer suitable for foliar application to accomplish weeding and feeding of corn, small grains or grass pastures in one operation. Use ESTERON 99 Concentrate in accordance with recommendations for these crops as given on this label. Use liquid fertilizer at rates recommended by supplier or Extension Service Specialist. Test for mixing compatibility using desired procedure and spray mix proportions in clear glass jar before mixing in spray tank. A compatibility aid such as UNITE(1) OR COMPEX(2) may be needed in some situations. Compatability is best with straight liquid nitrogen fertilizer solutions. Mixing with N-P-K solutions or suspensions may not be satisfactory, even with addition of a compatability aid. Pre-mixing ESTERON 99 Concentrate with 1 to 4 parts water may help in difficult situations.

(1) Trademark of Hopkins Chemical Company

(2) Trademark of Kalo Laboratories

Fill the spray tank about half full with the liquid fertilizer, then add the ESTERON 99 Concentrate with agitation and complete filling the tank with fertilizer. Apply immediately and continue agitation in the spray tank during application. **Do not store the spray mixture.** Application during very cold weather (near freezing) is not advisable.

WEED CONTROL IN SMALL GRAINS NOT UNDERSEEDED WITH A LEGUME: NOTE: Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 2 weeks after treatment.

Wheat, Barley and Rye: Apply ½ to 1 pint per acre. Spray when grain is in full tiller stage (usually 4 to 8 inches tall) but before the boot stage and boot to dough stage. For improved control of difficult weeds including wild garlic and wild onion or under dry or cool conditions, apply up to 2 pints per acre. Wild garlic and wild onion may not be killed but dockage should be reduced. Do not use higher rates unless possible crop injury will be acceptable. Consult State Agricultural Experiment Station or Extension Service Weed Specialists for recommendations or suggestions to fit local conditions.

Spring Seeded Oats: Apply ½ pint per acre at the full tiller stage but before the early boot stage. Oats are less tolerant to 2,4-D than wheat or barley and are more likely to suffer some injury.

Fall Seeded Oats (Southern) Grown for Grain: Apply ⅔ to 1⅓ pints per acre after full tillering but before the early boot stage. Some difficult weeds may require higher rates for maximum control but crop injury may result. Do not spray during or immediately following cold weather.

Preharvest Treatment: Apply 1 to 2 pints per acre when grains are in the hard dough stage to control large weeds that may interfere with harvest. Best results will be obtained when soil moisture is sufficient to cause succulent weed growth. **NOTE:** Do not feed treated straw to livestock.

WEED CONTROL IN CORN: Use one of the following three programs. **Preemergence:** Apply 1 to 2 quarts per acre to soil anytime after planting but before corn emerges. Only emerged broadleafed weeds are likely to be controlled. Do not apply more than 1 quart per acre unless the increased risk of crop injury can be tolerated. Do not use on light sandy soil. **Emergence:** Apply 1 pint per acre just as corn plants are breaking ground. **Postemergence:** After emergence of corn use ½ pint per acre. Application of ⅔ to 1 pint per acre may be needed for maximum control of some weeds but such rates are more likley to injure the corn. If corn is over 8 inches tall, use drop nozzles to keep the spray off the corn foliage as much as possible. Do not apply from the tasseling to dough stage. Do not use with oil, atrazine or other adjuvants. Crop injury is more likely to occur if corn is growing rapidly under high temperature and high soil moisture conditions. To reduce breakage of stalks from temporary brittleness caused by 2,4-D, delay cultivation for 8 to 10 days after treatment. Do not forage or feed corn fodder for 7 days following application. **NOTE:** Hybrids vary in response to 2,4-D and some are easily injured. Spray only varieties known to be tolerant to 2,4-D. Contact seed company or your Agricultural Experiment Station or Extension Service weed specialists for this information.

PREHARVEST CORN TREATMENT: After the hard dough or denting stage, apply 1 to 2 pints per acre by air or ground equipment to suppress perennial weeds, decrease weed seed production, and control tall weeds such as bindweed, cocklebur, dogbane, jimsonweed, ragweed, sunflower, velvetleaf and vines that interfere with harvesting. Do not forage or feed corn fodder for 7 days following application.

CONTROL OF WILD GARLIC AND WILD ONION IN STUBBLE GRAIN FIELDS: Following the harvest of small grain, soybeans, corn or grain sorghum, wild garlic and wild onion often produce new fall growth. This should be sprayed with 2 to 3 quarts per acre of ESTERON 99 Concentrate herbicide. This is a useful practice as one part of a control program. Do not forage for 7 days following application.

WEED CONTROL IN SORGHUM (MILO): Apply ½ pint per acre when sorghum is 5 to 15 inches tall. A higher rate of ¾ to 1 pint per acre may be needed to control some weeds but the chance for crop injury is likewise increased. Do not use with oil. Do not treat before the sorghum is 5 inches tall nor during the boot, flowering or early dough stages. If sorghum is taller than 8 inches, use drop nozzles to keep the spray off the foliage as much as possible. Temporary crop injury may occur under conditions of high soil moisture and high air temperatures. Varieties vary in tolerance to 2,4-D and some hybrids are quite sensitive. Spray only varieties known to be tolerant to 2,4-D. Contact seed company or your Agricultural Experiment Station or Extension Service weed specialists for this information.

GRASS SEED CROPS: Use 1 to 1½ pints per acre in the amount of water required for uniform application by air or ground equipment. Apply to established stands in spring from the tiller to early boot stage. Do not spray in boot stage. New spring seedings may be treated with the lower rate after the grasses have at least five leaves. Perennial weed regrowth may be treated in the fall.

WEED AND BRUSH CONTROL IN RANGELAND AND GRASS PASTURES: NOTE: Do not graze dairy animals on treated areas within 7 days after application. Do not use on bent grass, alfalfa, clover, or other legumes. Do not use on newly seeded areas until grass is well established. Do not use from early boot to milk stage where grass seed production is desired.

Bitterweed, Broomweed, Croton, Docks, Kochia, Marshelder, Muskthistle and Other Broadleaf Weeds: Use 2 quarts of ESTERON 99 Concentrate per acre in the amount of water needed for uniform application. If the weeds are young and growing actively, 1 quart per acre will provide control of some species. Deeprooted perennial weeds may require repeated treatments in the same year or in subsequent years.

Wild Garlic and Wild Onion. Apply 2 to 3 quarts per acre, making three applications (fall-spring-fall or spring-fall-spring) starting in late fall or early spring.

Weed Control in Newly Sprigged Coastal Bermudagrass: Apply 1 to 2 quarts per acre preemergence and/or postemergence.

Sand Shinnery Oak and Sand Sagebrush: On the oak, use 1 quart in 5 gallons of oil or in 4 gallons of water plus 1 gallon of oil per acre. Apply by aircraft between May 15 and June 15. On the sagebrush, use 1 quart in 3 gallons of oil per acre and apply by aircraft when foliage is fully expanded and the brush is actively growing.

Big Sagebrush and Rabbitbrush: Use 2 to 3 quarts per acre in 2 to 3 gallons of oil or in 3 to 5 gallons of oil-water emulsion spray. For rabbitbrush, the 3 quart rate is usually required. Brush should be leafed out and growing actively when treated. Retreatment may be needed.

Chamise, Manzanita, Buckbrush, Coastal Sage, Coyotebrush and Certain Other Chaparral Species: Use 2 to 3 quarts per acre in 5 to 10 gallons of water. One gallon of fuel oil may be included in the spray mixture for added effectiveness. Make applications by aircraft or ground equipment to obtain uniform spray coverage. For effective control, the brush **must** be fully leafed out and growing actively when sprayed. Reteatment may be needed.

WOODY PLANT CONTROL IN NON-CROP AREAS: To control species susceptible to 2,4-D in rights-of-way, fencerows, roadsides, and along drainage ditch banks, spray brush up to 5 to 8 feet tall after spring foliage is well developed, using 3 to 4 quarts of ESTERON 99 Concentrate in 100 gallons of water and wetting all parts of the brush including foliage, stems and bark. This may require up to 400 gallons of spray per acre for adequate coverage of solid stand of brush. Make application in such a way as to prevent drift of the spray off the area being treated. Spraying can be effective at any time up to 3 weeks before frost as long as the soil moisture is sufficient for active growth of the brush. Control will be less effective in midsummer during hot dry weather when soil moisture is deficient and plants are not actively growing. Oil or wetting agent may be added to the spray, if needed for increased effectiveness.

Forest Site Preparation: For control of susceptible broadleaf weeds and brush on sites to be planted in forests, use 1.5 to 8 quarts per acre of ESTERON 99 Concentrate herbicide in sufficient spray volume for good plant coverage, usually 6 to 25 gallons. Applications can be made by air or ground (hand gun, boom, or powered knapsack sprayer). Two to eight quarts of diesel oil per acre or a suitable surfactant or penetrant may be added to improve brush control.

Forest Conifer Release: For applications in late winter or spring to control susceptible deciduous brush species, such as alder, willow, poplars, cascara, cherry, service cherry and vine maple during early growth and before conifer budbreak, use ESTERON 99 Concentrate at rates up to 3 quarts per acre in diesel or stove oil by air or ground in sufficient spray volume for good plant coverage, usually 6 to 25 gallons. **Do not use in plantations where pine or larch are among the desired species.**

For treatment before conifer budbreak to control susceptible evergreen brush species, such as tanoak, mandrone, chinquapin, ceanothus spp. and manzanita or deciduous brush after leafout or broadleaf weeds, use ESTERON 99 Concentrate at rates up to 3 quarts per acre alone or with 0.5 to 2.0 gallons per acre of diesel or similar oil or suggested rates of suitable surfactants or penetrants. After conifer budbreak, ESTERON 99 Concentrate without oil, surfactant or penetrant can be used at rates up to 2 quarts per acre but may cause injury or suppression of the conifer growth. Use sufficient volume of spray for good coverage of brush, usually 6 to 25 gallons. Some species of pine may be seriously injured by treatment at these growth stages.

After conifer species such as white pine, ponderosa pine, jack pine, red pine, black spruce, white spruce, red spruce, and balsam fir cease growth and harden off and brush is still actively growing in late summer, 1.5 to 3.0 quarts of ESTERON 99 Concentrate per acre in enough water to obtain good plant coverage may be applied by air or ground to control certain competing hardwood species such as alder, aspen, birch, hazel and willow. Since this treatment may cause occasional conifer injury, do not use if such injury cannot be tolerated.

Directed Sprays in Conifer Plantations (including pine): Apply ESTERON 99 Concentrate herbicide at any time brush or broadleaf weeds are susceptible by directing spray around the conifers to avoid contact of needles with injurious amounts of spray. Rates of ESTERON 99 Concentrate are not to exceed 4 quarts per acre in oil, oil-water, or water carrier at 10 to 100 gallons per acre.

WEED CONTROL IN NON-CROP AREAS SUCH AS LAWNS, GOLF COURSES, CEMETERIES, PARKS, AIRFIELDS, ROADSIDES, VACANT LOTS, DRAINAGE DITCH BANKS: Apply 1 to 3 quarts of ESTERON 99 Concentrate per acre in the amount of water needed for uniform application. Usually 2 quarts per acre provides good weed control under average conditions. Treat when weeds are young and growing well. Do not use on golf greens nor on dichondra or other broadleaf herbaceous ground covers. Do not use on creeping grasses such as bent and St. Augustine except for spot treating, nor on newly seeded turf until grass is well established.

Reseeding of treated areas should be delayed following treatment. With spring application, reseed in the fall; with fall application, reseed in the spring. Legumes are usually damaged or killed so do not treat areas where legumes are desired. Deeprooted perennial weeds may require repeated treatments in the same season or in subsequent years.

TULE (BULRUSH) AND OTHER RUSHES: Mix 2 quarts of ESTERON 99 Concentrate herbicide and 1 gallon of diesel oil or kerosene, then add this mixture to 100 gallons of water. Spray to wet all foliage (400-800 gallons per acre). Addition of a wetting agent may be advisable. Apply in the spring during flower head emergence. Respray if needed when regrowth is 3 to 5 feet tall.

WEED CONTROL ON FALLOW LAND: Use 1½ to 2¼ quarts per acre on annual broadleaf weeds and up to 3 quarts per acre on established perennial species, such as Canada thistle and field bindweed. Apply to actively growing weeds. Do not plant treated fallow land until three months after treatment, or until chemical has disappeared from soil.

SPOT TREATMENT: To control broadleaf weeds in small non-cropland areas with a hand sprayer, use ¼ pint of ESTERON 99 Concentrate in 3 gallons of water and spray to thoroughly wet all weed foliage. Keep spray mixture agitated to prevent separation.

CONTROL OF WOODY WEEDS IN LOW—BUSH BLUEBERRY FIELDS IN MAINE: How to use: Mount a drum 8 to 10 feet long or some other suitable length, and 1½ to 2 feet in diameter on an axle such as an old hay rake frame. Cover the drum with water absorbent yet tough cloth which will resist rapid wear and tear. Draw the cloth-covered drum across the blueberry field and at the same time spray evenly onto the full length of the top of the cloth-covered drum a spray mixture made by diluting 1 quart of ESTERON 99 Concentrate in 50 gallons of water per acre. Have the drum mounted so that as it revolves on its axis it is high enough to miss most of the low bush blueberry stems, yet low enough to forcibly brush the spray-saturated cloth-covered drum against the higher woody weeds, principally sweet fern, wild cherry and poplar. Keep the cloth wet enough to provide top coverage of the weeds, yet not so wet as to allow runoff of the liquid which could cause injury to the blueberry plants.

When to Use: Apply during June and July when weed tops have emerged sufficiently above the blueberry stems to allow treatment of the weeds and not the blueberry plants. Apply only during the year before the first burn. To use this method of weed control, two-year burns should be extended to three years. **Caution:** Do not allow the spray being applied to the cloth-covered drum to be directed onto the blueberries. Do not harvest-rake field during the herbicide treatment year or until a two-year interval thereafter.

USE PRECAUTIONS

AVOID CONTACT WITH 2,4-D SUSCEPTIBLE CROPS AND OTHER DESIRABLE BROADLEAF PLANTS: Do not apply directly to or otherwise permit even minute amounts to contact cotton, grapes, tobacco, fruit trees, vegetables, flowers, ornamentals or other desirable plants susceptible to 2,4-D. Do not use in or near a greenhouse.

DO NOT APPLY IN THE VICINITY OF COTTON, GRAPES, TOBACCO, TOMATOES OR OTHER DESIRABLE 2,4-D SUSCEPTIBLE CROPS OR PLANTS. DO NOT SPRAY WHEN WIND IS BLOWING TOWARDS SUSCEPTIBLE CROPS OR ORNAMENTAL PLANTS.

AVOID SPRAY DRIFT: Applications should be made only when there is no hazard from spray drift since very small quantities of spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. A spray thickening agent such as NALCO TROL[1], may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

[1] NALCO TROL — Trademark of NALCO Chemical Company

GROUND EQUIPMENT: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 20 pounds spraying pressure at large droplet producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 6 to 7 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

DETERMINE AIR MOVEMENT AND DIRECTIONS BEFORE FOLIAR APPLICATION: Use a smoke generator or other means at or near the application site for the detection of air movement, air stability or temperature inversions. Such a condition exists when there is little or no wind and air temperature is lower near the ground than at higher levels. Use appropriate drift control measures or avoid application when smoke is moving toward nearby desirable susceptible plants or sensitive areas.

AERIAL APPLICATION: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 20 pounds spray pressure at the nozzles; by using straight stream nozzles directed straight back; by using a spray boom no longer than ¾ the wing or rotor span of the aircraft; and by spraying only when wind velocity is less than 6 mph.

Excessive amounts of this herbicide in the soil may temporarily inhibit seed germination or plant growth. Violent wind storms may move soil particles. If 2,4-D is on soil particles and they are blown onto the susceptible plants, visible symptoms may appear. Serious injury is unlikely. The hazard of movement of 2,4-D on dust is reduced if treated fields are irrigated or if rain occurs shortly after application.

AT HIGH TEMPERATURES, VAPORS FROM THIS PRODUCT MAY INJURE SUSCEPTIBLE PLANTS GROWING NEARBY.

To avoid injury to desirable plants, do not handle or apply other agricultural chemicals with the same equipment used for ESTERON 99 Concentrate unless appropriately cleaned first. Local conditions may affect the use of herbicides. Consult your State Agricultural Experiment Station or Extension Service weed specialists for cleaning methods which are in compliance with local regulations and for advice in selecting treatments from this label to best fit local conditions. Be sure that use of this product conforms to all applicable regulations. Apply this product only as specified on this label.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

STORAGE: Keep container tightly closed when not in use.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

MONEY BACK GUARANTEE

ESTERON 99 Concentrate herbicide is guaranteed by The Vertac Chemical Corporation to the full extent of the purchase price:

1. **To give satisfactory control of weed and brush species listed on container when used as recommended.**
2. **To form a suitable spray mixture in any water fit for spray use.**
3. **To store satisfactorily at temperatures as low as −40° F.**

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, express or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use. In no case shall Vertac or the Seller be liable for consequential, special or indirect damages resulting from the use or handling of this product.

10580-011-1 983

Manufactured for

VERTAC CHEMICAL CORPORATION

Memphis, Tennessee 38137, USA

* Trademark of VERTAC CHEMICAL CORPORATION

Notes

RESTRICTED USE PESTICIDE

For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification

Tordon* 2K

pellets herbicide

Complete Directions for Use, Use Precautions and Restrictions, Hazards and other Important Information for the Proper Use, Handling, Storage and Disposal of this product.

EPA Reg. No. 464-333 EPA Est. 464-MI-1

* Trademark of The Dow Chemical Company

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, express or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller and buyer assumes the risk of any such use.

US Patent No. 3,785,925

86-1497 **Form No. 87242-A282**

THE DOW CHEMICAL COMPANY
AND SUBSIDIARIES
MIDLAND, MICHIGAN 48640 USA HORGEN, SWITZERLAND HONG KONG
CORAL GABLES, FLORIDA 33134 USA SARNIA, ONTARIO, CANADA
Trademark of THE DOW CHEMICAL COMPANY

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

PRECAUCION AL USUARIO: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

TRANSLATION: (TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.)

In case of an emergency endangering life or property involving this product, call collect 517-636-4400

KEEP OUT OF REACH OF CHILDREN

CAUTION

DUST CAUSES IRRITATION
MAY BE HARMFUL IF SWALLOWED
Avoid Skin and Eye Contact
Wash After Handling

AGRICULTURAL CHEMICAL
Do Not Ship or Store with Food, Feeds, Drugs or Clothing

ACTIVE INGREDIENT:
Picloram (4-amino-3,5,6-trichloropicolinic acid) as the potassium salt 2.3%
INERT INGREDIENTS: 97.7%
Picloram acid equivalent — 2.0%

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Wyoming 20

FEDERAL (EPA) LABEL

TORDON 2K Pellets herbicide applied to the soil over plant roots is highly effective for the control of broadleaved perennial and annual weeds and undesirable woody plants on utility, highway and other right-of-ways, fencerows, headlands around farm and industrial buildings and storage sites.

For Control of Broadleaved Perennial and Annual Weeds: Apply TORDON 2K Pellets uniformly anytime during the normal growing season where sufficient moisture is available to carry the herbicide into the soil. In areas where little or no summer rainfall occurs, application should be made in late summer or early fall. Maximum effects of the treatment do not become apparent until the chemical has been carried by moisture into the soil.

TORDON 2K Pellets herbicide is effective against a wide range of weeds. Local conditions may affect the use of herbicides. Consult your State Agricultural Experiment Station or Extension Service weed specialists for local recommendations. Be sure that the use of this product conforms to all applicable regulations.

For Control of Woody Plants such as maple, locust, aspen, conifers, other woody trees, shrubs, wild rose, brambles, wild grapes and other vines, apply TORDON 2K Pellets uniformly to the soil over the root zone. Apply anytime during the normal growing season where sufficient moisture is available to carry the herbicide into the soil. In areas where little or no summer rainfall occurs applications should be made at "bud break" in late winter or early spring. Use at the rate of 300 to 400 pounds per acre (equivalent to approximately 7½ to 10 lb per 1000 square feet, 2 to 2½ lb per square rod, or ¾ to 1 lb per 100 sq ft). Maximum effects of the treatment do not become apparent until the chemical has been carried by moisture into the soil in the root zone of the plants.

APPLICATION RATES

Weeds Controlled†	TORDON 2K Pellets — Amount to apply	Remarks
Docks Larkspur Pigweed Povertyweed Sowthistle (perennial) Sunflower Tansy Thistle (plumeless) Toadflax (dalmation)	50 to 100 lb per acre 19 to 37 oz per 1000 sq ft 5 to 10 oz per square rod	Use lower rates in low rainfall areas in the northern states such as Idaho, Montana, North Dakota, Oregon, South Dakota, Wyoming, and Washington. Higher rates should be used where rainfall is greater or in southern states such as Arizona, Arkansas, Kansas, Missouri, New Mexico, Oklahoma and Texas
Bindweed (field) Bursage (bur ragweed woolyleaf povertyweed) Knapweed (Russian) Milkweed Spurge (leafy) Thistle (Canada)	100 to 150 lb per acre 37 to 56 oz per 1000 sq ft 10 to 16 oz per square rod	

† These are typical examples of weeds controlled

USE PRECAUTIONS

Avoid Improper Application: This herbicide is highly active against most broadleaved plants. Small quantities may cause damage to plants whether applied during the growing or dormant season. Do not apply or otherwise permit TORDON 2K Pellets to contact desirable plants such as vegetables, flowers, grapes, fruit trees, ornamentals, cotton, beans, soybeans and other valuable broadleaved plants, nor the soil containing roots of such plants growing there on or nearby or where such plants are to be grown.

Avoid Water Contamination: To avoid crop or other plant injury, do not treat inner banks or bottom of irrigation and drainage ditches. Do not contaminate water to be used for drinking or other domestic purposes.

Avoid Movement of Treated Soil: Avoid the movement of treated soil into untreated areas.

Other Precautions: Do not store near food, feedstuffs, fertilizer, seeds, insecticides, fungicides or other pesticides. To avoid injury to desirable plants, containers and equipment used for TORDON 2K Pellets should not be re-used to contain or apply other materials.

Dispose of empty containers: Burn or bury in noncroplands away from desirable plants and water supplies.

SPECIAL LOCAL NEEDS

IDAHO	EPA SLN No ID-790025
NEVADA	EPA SLN No NV-790008
N. DAKOTA	EPA SLN No ND-800009
OREGON	EPA SLN No OR-790057
S. DAKOTA	EPA SLN No SD-800003
UTAH	EPA SLN No UT-790016

For the Control of Susceptible Broadleaf Weeds and Woody Plants on Rangeland, Forests, and Permanent Grass Pastures

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

TORDON 2K Pellets herbicide is designed for application to soil for control of susceptible herbaceous and woody plants by absorption through root pick-up. Rainfall is needed after application to leach the picloram to the roots. Application can be made by hand or broadcast equipment. Generally uniform distribution over the rootzone of the plants in the intended site is desirable; however, certain plants may be treated by concentrating the dose near the stem of the target plants. Best

results are usually obtained when rain follows shortly after application and shortly before or during active growth. Do not apply TORDON 2K Pellets to frozen or saturated soil.

SUGGESTED USE RATES

	lb/A	oz/100 sq. ft.
Yellow starthistle, Scotch thistle, musk thistle, spotted or diffuse knapweeds, lupines, locoweeds.	25-50	1-2
Rush skeletonweed, Russian knapweed, Canada thistle, larkspurs, rabbitbrushes, burrowweed, snakeweed, fringed snakewort, milkweeds, artichoke thistle, tansy ragwort, common tansy, pricklypear and cholla cacti	50-100	2-4
Leafy spurge, Utah, Western and one-seed juniper	100-150	4-6
Wild Peach, rose, manzanita,	150-200	6-8

Utah, Western and one-seed junipers, pinyon, and several susceptible woody plants can be controlled by placing the required rates of TORDON 2K Pellets herbicide around the stem of the plants; use 2 oz. TORDON 2K Pellets herbicide for each 3-4 feet of tree height on juniper or pinyon trees not over 12 feet tall.

TORDON 2K Pellets herbicide at rates over about 75 lb per acre may suppress certain grasses, such as wheatgrass. Usually later grass growth will be improved by release from competition. Grass seedlings may be suppressed or killed up to 2 years after application at higher rates. Broadleaf forage plants, especially legumes, in treated areas may be injured or killed and may not grow for 1 or 2 years.

RESTRICTIONS FOR PASTURE AND RANGELAND USE

For use rates above 150 lbs. per acre, do not graze treated areas or feed treated forage for 16 weeks after application.

Limit coverage to no greater than 25% of an applicators acreage, found in any particular watershed.

Do not use where a sandy porous surface and substrate overlie ground water closer than 10 feet below the surface.

Where watersheds have significant slope and where rapid runoff can occur, use spot treatment only. Do not apply within ½ mile of where stream or pond water which drains from the treated watershed may be drawn to irrigate susceptible broadleaf crops, especially beans and potatoes. Do not clean containers or application equipment on or near these areas.

Kill or injury may occur to desirable forbs, trees or shrubs, such as blackberry, cherry, locust, poplar, mountain mahogany, bitterbrush and sumac, from root uptake. If such effects cannot be tolerated, do not apply on or near such desirable plants.

Do not apply to cropland used for production of desirable crops other than forage species. Do not rotate treated rangeland or pastures to other crops until residues of picloram have reached a nonphytotoxic level. Forage legumes on the treated areas may be injured and may not grow for two years or more after treatment.

Read and follow all other use precautions on this label.

USE PRECAUTIONS

Apply this product only as specified on this label. The active ingredient in TORDON 2K Pellets herbicide is water soluble and should not be applied where surface water from treated areas can run off to cropland either planted or to be planted.

Avoid use near desirable plants. This herbicide is water soluble, highly active and can remain in the soil for more than one growing season. Very small amounts can injure broadleaf plants such as potatoes, peas, beans, sugarbeets or alfalfa; therefore, do not apply on or near these or other susceptible plants, ornamentals, shade trees or vegetable crops. Do not plant these crops or plants in soil that may have injurious amounts of this herbicide.

Avoid movement of treated soil. Picloram may remain in treated soil for an extended period. Do not move treated soil to other areas and do not use such soil to grow plants until residues have reached a non-phytotoxic level.

Avoid transfer of livestock from a treated area to a broadleaf crop area without first allowing 7 days of grazing on untreated pasture for the first 12 months after application. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants. Do not use manure from animals grazing treated areas to fertilize soil or fields used to grow susceptible broadleaf crops.

Avoid water contamination. Do not allow TORDON 2K Pellets herbicide to contaminate water used for drinking, irrigation or other domestic purposes. Do not apply on inner banks or bottoms of irrigation ditches. Do not clean containers or application equipment on or near these areas.

Avoid improper storage and equipment use. Do not store near fertilizers, seeds, insecticides, fungicides or other pesticides. Containers and equipment used for TORDON 2K Pellets herbicide should not be used for other agricultural chemicals since small residues of TORDON 2K Pellets herbicide can damage desirable plants.

Avoid improper disposal. Rinse equipment and dispose of waste by burying in non-cropland away from water supplies. Do not reuse containers. Bury them with waste or dispose in a sanitary landfill or follow official container disposal regulations.

Be sure that use of this product conforms to all applicable state and federal regulations.

MONTANA ...... EPA SLN No. MT-800011

For the Control of Susceptible Broadleaf Weeds and Woody Plants on Rangeland, Forests, and Permanent Grass Pastures

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling

TORDON 2K Pellets Herbicide is designed for application to soil for control of susceptible herbaceous and woody plants by absorption through root pick-up. Rainfall is needed after application to leach the picloram to the roots. Application can be made by hand or broadcast equipment. Generally uniform distribution over the rootzone of the plants in the intended site is desirable, however, certain species may be controlled by concentrating the dose near the stem. Best results are usually obtained when rain follows shortly after application and shortly before or during active growth. Do not apply TORDON 2K Pellets to frozen or saturated soil

SUGGESTED USE RATES

	lb/A	oz/100 sq ft
Yellow starthistle, Scotch thistle, musk thistle, spotted and diffuse knapweeds, lupines, locoweeds	25-50	1-2
Rush skeletonweed, Russian knapweed, Canada thistle, Tall larkspur, Plains larkspur, rabbitbrush, burroweed, snakeweed, fringed sagebrush, common milkweed, artichoke thistle, tansy ragwort, common tansy, pricklypear and cholla cacti	50-100	2-4
Leafy spurge	100-150	4-6

TORDON 2K Pellets Herbicide at rates over about 75 lb per acre may suppress certain grasses, such as wheatgrass, bromegrass, buffalograss and bluegramma. Usually, later grass growth will be improved by release from competition. Grass seedlings may be suppressed or killed up to 2 years after application at higher rates. Broadleaf forage plants, especially legumes, in treated areas may be injured or killed and may not grow for 1 to 2 years

RESTRICTIONS FOR PASTURE AND RANGELAND USE

Limit coverage to no greater than 25% of an applicators acreage, found in any particular watershed

Do not use where a sandy porous surface and substrate overlie ground water closer than 10 feet below the surface

Where watersheds have significant slope and where rapid runoff can occur, use spot treatment only. Do not apply within ½ mile of where stream or pond water which drains from the treated watershed may be drawn to irrigate susceptible broadleaf crops, especially beans and potatoes. Do not clean containers or application equipment on or near these areas

Kill or injury may occur to desirable forbs, trees or shrubs, such as blackberry, cherry, locust, poplar, mountain mahogany, bitterbrush and sumac, from root uptake. If such effects cannot be tolerated, do not apply on or near such desirable plants

Do not apply to cropland used for production of desirable crops other than forage species. Do not rotate treated rangeland or pastures to other crops until residues of picloram have reached a nonphytotoxic level. Forage legumes on the treated areas may be injured and may not grow for two years or more after treatment

Read and follow all other use precautions on this label

USE PRECAUTIONS

Apply this product only as specified on this label. The active ingredient in TORDON 2K Pellets herbicide is water soluble and should not be applied where surface water from treated areas can run off to croplands either planted or to be planted

Avoid use near desirable plants. This herbicide is water soluble, highly active and can remain in the soil for more than one growing season. Very small amounts can injure broadleaf plants such as potatoes, peas, beans, sugarbeets or alfalfa, therefore, do not apply on or near these or other susceptible plants, ornamentals, shade trees or vegetable crops. Do not plant these crops or plants in soil that may have injurious amounts of this herbicide

Avoid movement of treated soil. Picloram may remain in treated soil for an extended period. Do not move treated soil to other areas and do not use such soil to grow plants until residues have reached a non-phytotoxic level

Avoid transfer of livestock from a treated area to a broadleaf crop area without first allowing 7 days of grazing on untreated pasture for the first 12 months after application. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants. Do not use manure from animals grazing treated areas to fertilize soil or fields used to grow susceptible broadleaf crops

Avoid water contamination. Do not allow TORDON 2K Pellets herbicide to contaminate water used for drinking, irrigation or other domestic purposes. Do not apply on inner banks or bottoms of irrigation ditches. Do not clean containers or application equipment on or near these areas.

Avoid improper storage and equipment use. Do not store near fertilizers, seeds, insecticides, fungicides or other pesticides. Containers and equipment used for TORDON 2K Pellets herbicide should not be used for other agricultural chemicals since small residues of TORDON 2K Pellets herbicide can damage desirable plants.

Avoid improper disposal. Rinse equipment and dispose of waste by burying in non-cropland away from water supplies. Do not reuse containers. Bury them with waste or dispose in a sanitary landfill or follow official container disposal regulations

Be sure that use of this product conforms to all applicable state and federal regulations.

WASHINGTON .... EPA SLN No. WA-810094

For the Control of Susceptible Broadleaf Weeds and Woody Plants on Rangeland, Forests, and Permanent Grass Pastures

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling

TORDON 2K Pellets herbicide is designed for application to soil for control of susceptible herbaceous and woody plants by absorption through root pick-up. Rainfall is needed after application to leach the picloram to the roots. Application can be made by hand or broadcast equipment. Generally uniform distribution over the rootzone of the plants in the intended site is desirable; however, certain plants may be treated by concentrating the dose near the stem of the target plants. Best results are usually obtained when rain follows shortly after application and shortly before or during active growth. Do not apply TORDON 2K Pellets to frozen or saturated soil

SUGGESTED USE RATES

	lb/A	oz/100 sq. ft.
Yellow starthistle, Scotch thistle, musk thistle, spotted or diffuse knapweeds, lupines, locoweeds	25-50	1-2
Rush skeletonweed, Russian knapweed, Canada thistle, larkspurs, rabbitbrushes, burrowweed, snakeweed, fringed snakewort, milkweeds, tansy ragwort, common tansy and pricklypear.	50-100	2-4
Leafy spurge and Western juniper	100-150	4-6
Wild Peach, rose, manzanita	150-200	6-8

Utah, Western and one-seed junipers, pinyon, and several susceptible woody plants can be controlled by placing the required rates of TORDON 2K Pellets herbicide around the stem of the plants; use 2 oz. TORDON 2K Pellets herbicide for each 3-4 feet of tree height on juniper or pinyon trees not over 12 feet tall

TORDON 2K Pellets herbicide at rates over about 75 lb per acre may suppress certain grasses, such as wheat grass. Usually later grass growth will be improved by release from competition. Grass seedlings may be suppressed or killed up to 2 years after application at higher rates. Broadleaf forage plants, especially legumes, in treated areas may be injured or killed and may not grow for 1 or 2 years

RESTRICTIONS FOR PASTURE AND RANGELAND USE

For use rates above 150 lbs per acre, do not graze treated areas or feed treated forage for 16 weeks after application

Limit coverage to no greater than 25% of an applicators acreage, found in any particular watershed

Do not use where a sandy porous surface and substrate overlie ground water closer than 10 feet below the surface

Where watersheds have significant slope and where rapid runoff can occur, **use spot treatment only.** Do not apply within ½ mile of where stream or pond water which drains from the treated watershed may be drawn to irrigate susceptible broadleaf crops, especially beans and potatoes. Do not clean containers or application equipment on or near these areas

Kill or injury may occur to desirable forbs, trees or shrubs, such as blackberry, cherry, locust, poplar, mountain mahogany, bitterbrush and sumac, from root uptake. If such effects cannot be tolerated, do not apply on or near such desirable plants

Do not apply to cropland other than pasture, rangeland, and forest. Do not rotate treated rangeland or pastures to other crops until residues of picloram have reached a non-phytotoxic level. Forage legumes on the treated areas may be injured and may not grow for two years or more after treatment

Read and follow all other use precautions on this label.

USE PRECAUTIONS

Apply this product only as specified on this label. The active ingredient in TORDON 2K Pellets herbicide is water soluble and should not be applied where surface water from treated areas can run off to croplands either planted or to be planted

Avoid use near desirable plants. This herbicide is water soluble, highly active and can remain in the soil for more than one growing season. Very small amounts can injure broadleaf plants such as potatoes, peas, beans, sugarbeets or alfalfa; therefore, do not apply on or near these or other susceptible plants, ornamentals, shade trees or vegetable crops. Do not plant these crops or plants in soil that may have injurious amounts of this herbicide

Avoid movement of treated soil. Picloram may remain in treated soil for an extended period. Do not move treated soil to other areas and do not use such soil to grow plants until residues have reached a non-phytotoxic level

Avoid transfer of livestock from a treated area to a broadleaf crop area without first allowing 7 days of grazing on untreated pastures for the first 12 months after application. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants. Do not use manure from animals grazing treated areas to fertilize soil or fields used to grow susceptible broadleaf crops

Do not contaminate water. Do not allow TORDON 2K Pellets herbicide to contaminate water used for drinking, irrigation or other domestic purposes. Do not apply on inner banks or bottoms of irrigation ditches. Do not clean containers or application equipment on or near these areas

Avoid improper storage and equipment use. Do not store near fertilizers, seeds, insecticides, fungicides or other pesticides. Containers and equipment used for TORDON 2K Pellets herbicide should not be used for other agricultural chemicals since small residues of TORDON 2K Pellets herbicide can damage desirable plants

Avoid improper disposal. Rinse equipment and dispose of waste by burying in non-cropland away from water supplies. Do not reuse containers. Bury them with waste or dispose in a sanitary landfill or follow official container disposal regulations.

Be sure that use of this product conforms to all applicable state and federal regulations.

WYOMING .... EPA SLN No. WY-800009

For the control of Susceptible Broadleaf Weeds and Woody Plants on Rangeland, Forests, and Permanent Grass Pastures.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling

TORDON 2K Pellets herbicide is designed for application to soil for control of susceptible herbaceous and woody plants by absorption through root pick-up. Rainfall is needed after application to leach the picloram to the roots. Application can be made by hand, broadcast, or aerial equipment. Generally uniform distribution over the rootzone of the plants in the intended site is desirable; however, certain species may be controlled by concentrating the dose near the stem. Best results are usually obtained when rain follows shortly after application and shortly before or during active growth. Do not apply TORDON 2K Pellets to frozen or saturated soil

SUGGESTED USE RATES

	lb/A	oz/100 sq ft
Yellow starthistle, Scotch thistle, musk thistle, plumeless thistle, spotted knapweed, diffuse knapweed, lupine, locoweed	25-50	1-2
Rush skeletonweed, tansy ragwort, Canada thistle, field bindweed, Russian knapweed, tansy, skeletonleaf bursage	50-100	2-4
Leafy spurge, common milkweed, Dalmation toadflax, yellow toadflax	100	4
Utah juniper, western juniper, oneseed juniper	100-150	4-6

Utah, western and oneseed junipers, pinyon, and several other susceptible woody plants can be controlled by placing the required rates of TORDON 2K Pellets herbicide around the stem of the plants; use 2 oz TORDON 2K Pellets herbicide for each 3 to 4 feet of tree height on juniper or pinyon trees not over 12 feet tall

TORDON 2K Pellets herbicide at rates over about 75 lb per acre may suppress certain grasses, such as wheatgrass, bromegrass, buffalograss and bluegramma. Usually, later grass growth will be improved by release from competition. Grass seedlings may be suppressed or killed up to 2 years after application at higher rates. Broadleaf forage plants, especially legumes, in treated areas may be injured or killed and may not grow for 1 to 2 years.

RESTRICTIONS FOR PASTURE AND RANGELAND USE

Limit coverage to no greater than 25% of an applicators acreage, found in any particular watershed.

Do not use where a sandy porous surface and substrate overlie ground water closer than 10 feet below the surface.

Where watersheds have significant slope and where rapid runoff can occur, **use spot treatment only.** Do not apply within ½ mile of where stream or pond water which drains from the treated watershed may be drawn to irrigate susceptible broadleaf crops, especially beans and potatoes. Do not clean containers or application equipment on or near these areas.

Kill or injury may occur to desirable forbs, trees and shrubs, such as blackberry, cherry, locust, poplar, mountain mahogany, bitterbrush and sumac, from root uptake. If such effects cannot be tolerated, do not apply on or near these or other desirable plants.

Do not apply to cropland used for production of desirable crops other than forage species. Do not rotate treated rangeland or pastures to other crops until residues of picloram have reached a non-phytotoxic level. Forage legumes on the treated areas may be injured and may not grow for two years or more after treatment.

Read and follow all other use precautions on this label.

USE PRECAUTIONS

Apply this product only as specified on this label. The active ingredient in TORDON 2K Pellets herbicide is water soluble and should not be applied where surface water from treated areas can run off to croplands either planted or to be planted.

Avoid use near desirable plants. This herbicide is water soluble, highly active and can remain in the soil for more than one growing season. Very small amounts can injure broadleaf plants such as potatoes, peas, beans, sugarbeets or alfalfa, therefore, do not apply on or near these or other susceptible plants, ornamentals, shade trees or vegetable crops. Do not plant these crops or plants in soil that may have injurious amounts of this herbicide.

Avoid movement of treated soil. Picloram may remain in treated soil for an extended period. Do not move treated soil to other areas and do not use such soil to grow plants until residues have reached a non-phytotoxic level.

Avoid transfer of livestock from a treated area to a broadleaf crop area without first allowing 7 days of grazing on untreated pasture for the first 12 months after application. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants. Do not use manure from animals grazing treated areas to fertilize soil or fields used to grow susceptible broadleaf crops.

Avoid water contamination. Do not allow TORDON 2K Pellets herbicide to contaminate water used for drinking, irrigation or other domestic purposes. Do not apply on inner banks or bottoms of irrigation ditches. Do not clean containers or application equipment on or near these areas.

Avoid improper storage and equipment use. Do not store near fertilizers, seeds, insecticides, fungicides or other pesticides. Containers and equipment used for TORDON 2K Pellets herbicide should not be used for other agricultural chemicals since small residues of TORDON 2K Pellets herbicide can damage desirable plants.

Avoid improper disposal. Rinse equipment and dispose of waste by burying in non-cropland away from water supplies. Do not reuse containers. Bury them with waste or dispose in a sanitary landfill or follow official container disposal regulations.

Be sure that use of this product conforms to all applicable state and federal regulations.

SPECIMEN LABEL

REDUCED TO 82%

RESTRICTED USE PESTICIDE

For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

DOW

Tordon 22K

Weed Killer

Complete Directions for Use, Use Precautions and Restrictions, Hazards and other Important Information for the Proper Use, Handling, Storage and Disposal of this product.

EPA Reg. No. 464-323 **EPA Est. 464-MI-1**

Trademarks of The Dow Chemical Company

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

PRECAUCION AL USUARIO: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.
TRANSLATION: (TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.)
In case of emergency endangering life or property involving this product, call collect 517-636-4400.

KEEP OUT OF REACH OF CHILDREN

CAUTION

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

MAY CAUSE IRRITATION
Avoid Contact with Skin and Eyes
Avoid Breathing Spray Mist
Keep Container Closed
Physical or Chemical Hazards
Do Not Cut or Weld Container

Environmental Hazards

Do not apply directly to water. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not contaminate irrigation ditches or water used for irrigation or domestic purposes.

AGRICULTURAL CHEMICAL

Do Not Ship or Store with Food, Feeds, Drugs or Clothing

ACTIVE INGREDIENT
Picloram (4-amino-3,5,6-trichloropicolinic acid) as the potassium salt 24.4%
INERT INGREDIENTS: 75.6%
Acid Equivalent: Picloram (4-amino-3,5,6-trichloropicolinic acid) 21.1% — 2 lbs./gallon.

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FEDERAL (E.P.A.) LABEL

GENERAL INFORMATION

Use TORDON 22K Weed Killer on non-cropland areas such as fence rows, around farm buildings, equipment pathways and outer banks of ditches, to control annual and deep rooted perennial weeds such as Absynth wormwood · Brackenfern · Buffalo bur · Bur ragweed · Burroweed · Cactus species · Camel thorn · Catclaw acacia · Chaparral species · Dock · Firebrush · Field bindweed (perennial morningglory) · Fringed sagebrush · Gambel oak · Goldenrod · Gorse · Guava · Hau · Horsenettles, Carolina, white · Java plum · Junipers · Knapweeds, diffuse, Russian, spotted, squarrose · Lantana · Larkspurs · Leafy spurge · Live oak · Locoweeds · Lupines · Melastoma · Mesquite · Ox-eye daisy · Milkweed · Pamakani · Poison Oak · Pinyon · Pricklypear cactus · Rabbitbrush · Rush skeletonweed · Scotch broom · Snakeweeds · Sowthistle · Starthistles, Iberian, purple, yellow · Tansy ragwort · Toadflaxes · Thistles, artichoke, Beaumont, Canada, distaff, golden, Italian, musk, scotch, wavy leaf.

Picloram is highly potent, persistent and water soluble. Tiny amounts can kill or injure many broadleafed plants. To prevent damage to desirable crops and plants **follow all directions and precautions**.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Mix the required amount of TORDON 22K Weed Killer in water and apply as a coarse low pressure spray using ground equipment or aircraft. For best results treat when the weeds are growing actively in the spring before full bloom or late summer into fall. Treatments during full bloom or seed stage of some weeds may not give good control.

For General Use on Perennial Weeds on Non-Cropland, use 1 to 1-1/2 gallons of TORDON 22K Weed Killer per acre in 50 to 100 gallons of water and spray to wet weed foliage and soil. **NOTE**: Local conditions may affect the use of herbicides. State agricultural experiment stations or extension service weed specialists in many states issue recommendations to fit local conditions. Be sure that use of this product conforms to all applicable regulations.

For Use As A Spot Treatment on Perennial Weeds. Mix at the rate of 1 gallon of TORDON 22K per 100 gallons of water. Apply at the rate of 100 gallons of spray mixture per acre. This will provide a rate of 2 pounds of picloram per acre. For small amounts use 2-1/2 fluid ounces TORDON 22K per 2 gallons of water. For round patches apply as indicated in the table.

Feet across Round Patch to be treated (weed area plus 10 feet border)	Gallons of spray mixture to apply
25	1.0
50	4.5
75	10.0
100	18.0
235 or (1 acre)	100.0

Tank Mixture for Spot or Broadcast Treatment of Susceptible Annual and Perennial Broadleaf Weeds: TORDON 22K may also be tank mixed with 2,4-D products such as ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4, or ESTERON 6E herbicides for use on areas having mixed species including those which respond well to 2,4-D. In tank mix combinations, use up to 1 quart of TORDON 22K with 1 to 2 quarts of ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre in spray volumes specified above. Read and follow all directions and use precautions on other product labels.

Be Sure You Follow All Use Precautions Given on This Label and Remember These Key Points

1. Use only the recommended amounts.
2. Picloram is persistent. It will carry over in the soil.
3. TORDON 22K is water soluble. It can move with water in irrigation or drainage ditches.
4. Spray drift can damage crops.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissable areas of use as promulgated by state or local authorities.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugarbeets, sunflower, tomatoes, and other vegetable crops, flowers, fruit plants, ornamentals, shade trees nor the soil containing roots of nearby valuable plants.

AVOID SPRAY DRIFT: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. To avoid spray drift use low spray pressure, under 30 psi, spray when wind velocity

is less than 10 mph, and apply as a coarse spray. The spray thickening agent NALCO-TROL(1) may be used with this product to aid in reducing spray drift. If this thickening agent is used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment spray drift can be lessened by keeping the spray boom as low as possible, by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by using straight stream nozzles directed straight back, and by using a spray boom no longer than 3/4 the wing span of the aircraft.

DETERMINE AIR MOVEMENT AND DIRECTIONS BEFORE FOLIAR APPLICATION. Use a smoke generator or other means at or near the application site for the detection of air movement, air stability or temperature inversions. Use appropriate drift control measures or avoid application when smoke is moving toward nearby desirable susceptible plants or sensitive areas, such as human buffered areas. Avoid application when smoke forms layers or otherwise indicates inversion conditions which would prevent spray droplets from dispersing or falling to the intended spray site.

Do Not Contaminate Water. To avoid crop or other plant injury, do not treat or allow spray drift to fall onto inner banks or bottom of irrigation and drainage ditches. Dike around and do not irrigate through treated areas. Do not contaminate water used for drinking or other domestic purposes.

Do Not Move Treated Soil. Do not go over treated areas with land levelers, cultivation or harvesting equipment, or move the soil by any other means. Mark off treated areas with stakes, posts or fencing.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE DISPOSAL

Pesticide, spray mixture or rinsate that cannot be used according to label instructions must be disposed of according to Federal, State, or local procedures under the Resource Conservation and Recovery Act.

86-1754 PRINTED IN U.S.A. IN SEPTEMBER, 1983.
REPLACES SPECIMEN LABEL 86-1754 PRINTED IN MAY, 1982.
DISCARD PREVIOUS SPECIMEN LABELS.
REVISIONS INCLUDE: ADDITION OR MODIFICATION OF STATE SLNs
ID-780009, NV-790007, OR-780012, UT-820011, WA-820068, ID-820030,
OR-820061, WA-820061, KS-820024, MO-790004, ND-780002, TX-830003

SL2310

CONTAINER DISPOSAL
Do not reuse containers. Dispose of them in a sanitary landfill or by other approved state and local procedures.

SPECIAL LOCAL NEEDS

ARIZONA .... EPA SLN NO. AZ-800001

For Spot Treatment of Broom Snakeweed, Thistles, Locoweeds, Lupines, Larkspurs, Horsenettle, Burroweed, Cactus Species, Mesquite, Catclaw Acacia, Chapparral Species, Juniper, Pinyon, Rabbitbrush and Other Woody and Herbaceous Plants on Rangeland and Permanent Grass Pastures.

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Consult your range or weed extension specialist for additional information on this program.

Mix the required amount of TORDON 22K Weed Killer in water and apply as a coarse, low pressure spray using ground equipment or aircraft. For best results, treat when the weeds are growing actively in the spring before full bloom or late in summer or fall. Treatments during full bloom or seed stage of some weeds may not give good weed control.

SPOT TREATMENT: Suggested rates to control several broadleaf weeds and brush are shown in the table below. Apply only once during any one growing season. Retreat in subsequent years as needed using similar rates. TORDON 22K Weed Killer may be tank mixed with ESTERON® 99® Concentrate, FORMULA 40®, DMA® 4 or ESTERON 6E herbicides (phenoxy) or other herbicides cleared for use in rangelands to control mixed species. In tank mix combinations, use 1/4 to 1 qt. of TORDON 22K Weed Killer with 1 to 2 qt. of ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 qt. ESTERON 6E per acre. **Read and follow all directions and use precautions on other product labels.**

Weed or Brush Species	Rate of TORDON 22K Weed Killer per	
	Treated Acre	100 sq. ft.
Annual thistles, rabbitbrushes[1], lupines, locoweeds, broom snakeweed, mesquite	½-1 qt.	1.1-2.2 ml or ¼-½ tsp.
Prickly pear and cholla cactus, burroweed, plains larkspur, catclaw acacia	1-2 qt.	2.2-4.5 ml or ½-1 tsp.
White horsenettle, Russian knapweed, pinyon, juniper, chaparral species[2]	2-3 qt.	4.5-6.8 ml or 1-1½ tsp.
Tall larkspur, Gambel oak[2], live oak brush[2]	3-4 qt.	6.8-9.0 ml. or 1½-2 tsp.

[1] Add 1½ to 2 qt. ESTERON 99 Concentrate per acre for sagebrush control also.

[2] Add 2-3 qt. ESTERON 99 Concentrate herbicide.

GROUND APPLICATION: When applying TORDON 22K Weed Killer with ground equipment, use coarse, low pressure spray (under 30 psi) and apply uniformly to provide good coverage of the weeds. Apply only when weather conditions are favorable for keeping spray on the target area. Do not allow spray drift to contact off-target susceptible plants, or areas to be planted to susceptible crops. Do not apply when wind velocity exceeds 10 mph. Where desirable susceptible plants, such as potatoes, beans and other vegetable crops, ornamentals or legumes are growing or may be planted within 1/2 mile, apply TORDON 22K Weed Killer only if air movement is continuously from a definite direction and away from these plants.

AERIAL APPLICATION: When applying by aircraft, pilot must comply with all applicable state and local regulations. When applying TORDON 22K Weed Killer by air, use coarse, low pressure spray (under 30 psi) and apply uniformly to provide good coverage of weeds. The distance between outer-most nozzles should not exceed 3/4 of the wing or rotor length. Apply only when weather conditions are favorable for keeping spray on target area.

Do not allow spray drift to contact off-target susceptible plants. Do not apply when wind velocity exceeds 10 mph, or as required by state regulations. Do not spray when air temperature exceeds 85° F. Where desirable susceptible plants, such as potatoes, beans, and other vegetable crops, ornamentals or legumes are growing or may be planted within 1 mile for helicopters under 55 mph or 4 miles for fixed wing aircraft, apply TORDON 22K Weed Killer only if air movement is continuously from a definite direction and away from these plants.

For treatment of small patches of broadleaf weeds, use 1/2 to 4 quarts of TORDON 22K Weed Killer in 100 gallons of water and spray weed foliage uniformly using 50 to 100 gallons of spray per treated acre. Mixtures with other herbicides referred to above can be made to control more species. NOTE: For treating small areas, 1 qt. TORDON 22K Weed Killer in 100 gals. of water per acre is equivalent to 2 teaspoonsful per gallon of water applied to a 500 square foot area. Basal applications of undiluted TORDON 22K Weed Killer can be made using 2 ml (1/2 teaspoon) per 3 ft. of tree height of juniper or pinyon; treat shortly before a rain to leach the herbicide into the soil.

GRAZING RESTRICTIONS: Do not graze animals on treated areas within 30 days after application.

USE PRECAUTIONS
Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply to frozen or saturated ground.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, cotton, melons, potatoes, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift. Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent, NALCO-TROL(1) may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips; by spraying when wind velocity is low; and, by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at nozzles; by using straight stream nozzles directed straight back; by using a spray boom no longer than 3/4 the wing span of the aircraft; and, by spraying only when wind velocity is 10 mph or less.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not rotate treated rangeland or pasture to other crop uses, as long as residues which persist in the soil may affect susceptible crops.

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also new legume seedlings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

IDAHO .... EPA SLN NO. ID-780009
NEVADA .... EPA SLN NO. NV-790007
OREGON .... EPA SLN NO. OR-780012
UTAH .... EPA SLN NO. UT-820011
WASHINGTON .... EPA SLN NO. WA-820066

For control of Yellow Starthistle, Scotch, Musk, and Canada Thistles, Spotted, Diffuse and Russian Knapweeds, Rush Skeletonweed, Larkspur, Leafy Spurge, Rabbitbrush spp., Tansy Ragwort, Field Bindweed, Poison Oak, Gorse, Dalmation Toadflax, Buffalo Bur, Henbane and other Susceptible Poisonous Plants, Broadleaf Weeds and Woody Plants on Rangeland and Permanent Grass Pastures.

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Mix the required amount of TORDON 22K Weed Killer in water and apply as a coarse, low pressure spray using ground equipment or helicopter.

For best results, treat when the weeds are growing actively in the spring before full bloom or in late summer or fall. Treatments during full bloom or seed stage of some weeds may not give good control.

BROADCAST TREATMENT: TORDON 22K Weed Killer can be applied as a broadcast treatment at rates of 1 quart or less per acre; higher rates can be used on patches but the total areas treated should be regulated so no more than 25 gals. of TORDON 22K Weed Killer is used on any 100 acre block in a single season. Suggested rates to control several broadleaf weeds are shown in the table below. Weeds requiring higher rates may be suppressed with rates of 1 quart per acre. Apply as a single broadcast spray during any one growing season. Retreat in subsequent years as needed using similar rates. TORDON 22K Weed Killer may be tank mixed with ESTERON® 99® Concentrate, FORMULA 40®, DMA® 4 or ESTERON® 6E herbicides (2,4-D products) for use on areas having mixed species including those which respond well to 2,4-D, such as big sagebrush. In tank mix combinations, use 1/4 to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4 or with 2/3 to 1-1/3 quarts ESTERON 6E per acre.

Weed Species	Rates of TORDON 22K per Treated Acre
Yellow Starthistle†, Scotch Thistle, Musk Thistle, Ox-eye Daisy	¼ to ½ quart
Diffuse Knapweed, Spotted Knapweed, Henbane, Buffalo Bur, Rabbitbrush spp., Tansy Ragwort	½ to 1 quart
Canada Thistle, Rush Skeletonweed, Russian Knapweed, Dalmation Toadflax, Gorse	2-3 quarts††
Leafy Spurge†, Larkspur†, Field Bindweed, Poison Oak†	4 quarts††

†Denotes poisonous plants
††Lower rates may be used for short-term suppression

GROUND APPLICATION: When applying TORDON 22K Weed Killer with ground equipment, use coarse low pressure spray (under 30 psi) and apply uniformly to provide good coverage of the weeds. Apply only when weather conditions are favorable for keeping spray on the target area. Do not allow spray drift to contact off-target susceptible plants, or areas to be planted to susceptible crops. Do not apply when wind velocity exceeds 10 mph. Where desirable susceptible plants, such as potatoes, beans, peas and other vegetable crops, ornamentals or legumes **are growing or may be planted within 1/2 mile**, apply TORDON 22K **only if air movement is continuously from a definite direction and away from these plants.**

AIR APPLICATION: When applying by aircraft, pilot must comply with all applicable state and local regulations. When applying TORDON 22K Weed Killer by air, use coarse, low pressure spray (under 25 psi) and apply uniformly to provide good coverage of the weeds. Apply only when weather conditions are favorable for keeping spray on target area. Do not allow spray drift to contact off-target susceptible plants. Do not apply when wind velocity exceeds 10 mph, or as required by state regulations. The distance between outermost nozzles should not exceed 3/4 of the wing or rotor length. Do not spray when air temperature exceeds 85° F. Where desirable susceptible plants, such as potatoes, beans, peas and other vegetable crops, ornamentals or legumes are growing or may be planted within 1 mile, apply TORDON 22K Weed Killer by helicopter only if air movement is continuously from a definite direction and away from these plants at the time of application. Fixed wing aircraft may be used only in areas east of the crest of the Cascade Mountains under the above conditions provided that fields or homesites where susceptible plants may be growing or be planted are over 3 miles downwind at the time of application.

SPOT TREATMENT: For spot treatment of small patches of broadleaf weeds, use 1/2 to 4 quarts of TORDON 22K in 100 gallons of water and spray weed foliage uniformly using 50 to 100 gallons of spray per treated acre.

NOTE: For treating small areas, 1 quart TORDON 22K Weed Killer in 100 gallons of water per acre is equivalent to 2 teaspoonsful per gallon of water applied to a 500 square foot area.

GRAZING RESTRICTIONS: (Where rates greater than 1 quart per acre are applied). Do not graze dairy animals on treated areas within 2 weeks after application. Other animals should be withdrawn from treated areas at least 3 days before slaughter. Observe grazing restrictions on other product labels when using tank mixtures.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas is likely to run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches. Do not apply to frozen ground.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, clovers, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift. Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent NALCO-TROL(1) may be used with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible, by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet-producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application. Drift can be lessened by applying a coarse spray, by using no more than 25 pounds spray pressure at nozzles, by using nozzles which do not produce hazardous amounts of fine spray droplets, by using a spray boom no longer than 3/4 of the rotor or wing length, and by spraying only when wind velocity is less than 10 mph, or as required by state regulations.

Determine Air Movement and Direction Before Foliar Application. Use a smoke generator or other means at or near the application site or on aircraft for detection of air movement, air stability, or temperature inversions. Such a condition exists when there is little or no wind and air temperature is lower near the ground than at higher levels. Use appropriate drift control measures or avoid application when smoke is moving toward nearby desirable susceptible plants or sensitive areas.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also, new legume seedings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

READ AND FOLLOW MIXING AND USE INSTRUCTIONS AND PRECAUTIONS ON PRODUCT CONTAINER LABEL

IDAHO	EPA SLN NO. ID-820030
OREGON	EPA SLN NO. OR-820061
WASHINGTON	EPA SLN NO. WA-820061

For Control of Susceptible Perennial Broadleaf Weeds in Non-irrigated Fallow Cropland East of the Cascade Mountains

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

PERENNIAL BROADLEAF WEED CONTROL IN FALLOW GRAINLAND

To control perennial broadleaf weeds, such as bindweed and Canada thistle, in fallow grainland, follow a treatment schedule and apply TORDON 22K Weed Killer at 1 to 1-1/2 quarts per acre after grain harvest. The addition of 2,4-D at 1 to 2 lbs. a.e. per acre may significantly improve weed control. The treated area should extend at least 10 feet beyond the visible weeds. During the next season retreat the same fallow area with 1 pint of TORDON 22K. Adding 2,4-D to the tank mix may improve weed control. Treated areas can be relocated more readily if marked with flags or painted stakes. A **permanent record** of rates of TORDON 22K Weed Killer and dates of treatment should be made by the grower to aid in planning future crop rotations.

When starting treatment in the fallow season before planting, apply 1 pint of TORDON 22K per acre when weeds are growing well either early in the season or treating regrowth after removing early weeds by cultivation. Retreat the same fallow area with 1 to 1-1/2 quarts of TORDON 22K Weed Killer per acre after harvest of grain the next summer.

Treatments of TORDON 22K at rates over 1.5 quarts per acre can be made on fallow, non-irrigated cropland if the treated areas comprise less than 10% of the immediate field in any one year. TORDON 22K should not be applied to cropland at rates exceeding 1 gallon per acre.

To prepare the spray, mix the required amount of TORDON 22K Weed Killer and 2,4-D or other approved herbicides or additives in water and apply as a coarse, low pressure spray in sufficient volume for adequate coverage.

For Ground Application: Use enough spray volume to provide adequate coverage without producing hazardous amounts of drift. Care must be used to prevent off-target injury to plants especially with very low volume rates. Where desirable susceptible plants such as potatoes, legumes, other vegetable crops or ornamentals are growing or may be planted in the vicinity, apply TORDON 22K only if air movement is from a definite direction away from these plants at time of application.

DO NOT APPLY WITH AIRCRAFT

NOTE: Small grains planted after fallow land treatment with TORDON 22K may be adversely affected to varying degrees, depending on rate of application, rainfall and temperature. Sensitive crops such as peas, lentils, potatoes or beans, must not be planted until crop injurious residues of picloram have disappeared.

Livestock may graze treated fields with the following restrictions when applying more than 1 quart TORDON 22K per acre: (1) Meat animals grazing for up to two weeks after treatment should be removed from treated areas 3 days prior to slaughter. (2) Do not graze dairy animals on treated areas within 2 weeks after treatment.

USE PRECAUTIONS

Use this product only as specified on this label and product label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state and local authorities.

Do Not Contaminate Water Intended for Irrigation or Domestic Purposes. Do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to

minimize drift since, under adverse weather conditions such as temperature inversions, fine spray droplets may drift a mile or more. Spray thickening agents, such as NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible, by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce fine-droplet spray.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequately sensitive bioassays show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grazing areas onto broadleaf crop areas during first full season after treatment without allowing 7 days of grazing on an untreated area. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie groundwater 10 feet or less below the surface.

READ AND FOLLOW MIXING AND USE INSTRUCTIONS AND PRECAUTIONS ON PRODUCT CONTAINER LABEL

IOWA	EPA SLN NO. IA-790007
KANSAS	EPA SLN NO. KS-800018

For the Control of Musk Thistle in Rangeland and Permanent Grass Pastures

GENERAL INFORMATION

Use TORDON 22K Weed Killer to control musk thistle growing in rangeland or permanent grass pastures. Picloram, the active ingredient in TORDON 22K Weed Killer, is highly active, persistent, and water soluble. To prevent damage to desirable crops and plants follow all directions on this label.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Mix the required amount of TORDON 22K Weed Killer in the specified amount of water and apply broadcast with conventional ground equipment. Use enough spray volume to provide uniform coverage of the weeds, usually 10 to 20 gallons per acre. Do not apply by air or with a mist blower.

Apply when musk thistle plants are in the rosette stage of growth or before flower stock elongates over 2 inches above leaves in the spring or in the fall prior to soil freeze-up. Treat no more than once in any 12-month period and no more than twice in any three-year period.

Use 6 to 8 fl oz (3/8 to 1/2 pt) of TORDON 22K Weed Killer in 10 to 20 gallons of water per acre and apply as a coarse, low-pressure (20 to 30 psi) spray. Apply only when weather conditions are favorable for keeping spray on target area. Do not apply when wind velocity exceeds 10 mph. Where desirable susceptible plants (see **Use Precautions**) are growing within 1/2 mile of the application site apply TORDON 22K only if air movement is continuous from a definite direction away from these plants.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations including method of application and permissible areas of use, promulgated by state or local authorities.

Handle and Use Correctly. Small amounts of TORDON 22K Weed Killer can injure sensitive broadleaf plants. To avoid problems, observe the following precautions:

1. **Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches.** Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent croplands, either planted or to be planted, or into drainage channels, streams, irrigation ditches, ponds, or wells. Do not clean containers or application equipment on or near these areas. Do not apply on inner banks or bottoms of irrigation ditches.
2. **Do Not Apply to or in the Vicinity of Sensitive Crops or Desirable Plants** including alfalfa, beans, cotton, grapes, melons, peanuts, peas, potatoes, safflower, sugar beets, soybeans, sunflower, tobacco, tomatoes, other field or vegetable crops, flowers, fruit plants, ornamentals, or shade trees. Do not apply on areas which may be planted at a later time to such crops or plants.
3. **Do Not Apply to Cropland Used for Production of Desirable Crops Other Than Forage Grasses.** Do not rotate treated rangeland or pasture to other crop uses.
4. **Do Not Spray Pastures if the Forage Legume Component is Substantial and Desired.** TORDON 22K Weed Killer may injure or kill forage legumes. Also, new legume seedling establishment may not be successful if seeded within 2 years following application of this herbicide.
5. **Do Not Move Treated Soil to Other Areas.** Do not use it to grow plants, unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.
6. **Do Not Transfer Livestock** from treated grass area onto a broadleaf crop area without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.
7. **Do Not Store Near Food,** feedstuff, fertilizer, seed, insecticides, fungicides, or other pesticides.
8. **Do Not Reuse Containers for TORDON 22K Weed Killer for Any Purpose.** Dispose by punching holes in them and burying with waste or by taking to an approved sanitary landfill. Rinse application and handling equipment thoroughly after use, preferably a minimum of three times with clean water, and dispose of rinse water in a non-cropland area away from water supplies. Where indicated, follow official local container disposal regulations.
9. **Do Not Allow Spray Drift.** Do not permit any spray or spray drift to contact desirable plants off the area treated or the soil containing roots of such plants.

To avoid spray drift, use low spray pressure, under 30 psi and apply as a coarse spray. Do not use pressures nor spray nozzles that produce fine droplets which would pesent a drift hazard. Spray TORDON 22K Weed Killer only when wind velocity is less than 10 mph and **when there is no hazard from spray drift off the target area. Do not spray when the wind is blowing toward susceptible crops or ornamental plants that are one mile from the target area.**

10. **Do Not Use Where a Sandy Porous Surface and Substrate Overlie Ground Water Ten Feet or Less Below the Surface.**
11. **Be Sure That Use of This Product Conforms to All Applicable Regulations.**

KANSAS EPA SLN NO. 820024

For the Control of Musk Thistle in Rangeland and Permanent Grass Pastures

GENERAL INFORMATION

Use TORDON 22K Weed Killer to control musk thistle growing in rangeland or permanent grass pastures. Picloram, the active ingredient in TORDON 22K Weed Killer, is highly active, persistent and water soluble. To prevent damage to desirable crops and plants follow all directions on this label.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Mix the required amount of TORDON 22K Weed Killer in the specified amount of water and apply broadcast by air or ground equipment. Apply as a coarse, low-pressure spray using enough spray volume to provide uniform coverage of weeds. Do not apply with a mist blower.

Apply in the fall when musk thistle plants are in the rosette stage of growth. **Treat prior to soil freeze up,** October 1 through December 1. For spring application, apply by ground only. Treat when musk thistle plants are in the rosette stage of growth and before the flower stalk elongates over two inches above the rosette leaves. Spraying after this time is likely to result in unsatisfactory control. Treat no more than once in any 12-month period, no more than twice in any three-year period.

Use six to eight ounces (3/8 - 1/2 pint) of TORDON 22K Weed Killer usually in 1 to 4 gallons of water per acre by air or in 10 to 20 gallons of water per acre with ground application. The higher rate is preferred if flower stalks are nearing the two-inch height.

Apply only when weather conditions are favorable for keeping spray on the target area. Do not treat by aerial application any musk thistle infestation in the understory of areas designated as forest (land supporting timber stands 120 feet wide), wooded strips or wooded pasture where the tree component is desirable. These areas should be treated by spot application only. Where wooded areas or other desirable susceptible plants are growing within 1/2 mile of the application site, apply TORDON 22K only if air movement is continuous in a direction away from these plants. (See Use Precautions.)

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Water Intended for Irrigation or Domestic Purposes. Do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches, either dry or containing water or other channels that carry water that may be used for irrigation purposes.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, forest and shade trees or the soil containing roots of nearby valuable plants.

AVOID SPRAY DRIFT: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. To avoid spray drift use low spray pressure, apply as a coarse spray, and spray when wind velocity is low. A spray thickening agent such as NALCO-TROL(1) may be used with this product to aid in reducing spray drift. If a thickening agent is used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Application: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible, by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: Drift can be lessened by applying a coarse spray, by using no more than 25 pounds spray pressure at nozzles, by using nozzles which do not produce hazardous amounts of fine spray droplets, by using a spray boom no longer than 3/4 of the rotor or wing length, and by spraying only when wind velocity is less than 10 mph, or as required by state regulations.

Determine Air Movement and Direction Before Foliar Application: Use a smoke generator or other means at or near the application site or on aircraft for detection of air movement, air stability, or temperature inversions. Such a condition exists when there is little or no wind and air temperature is lower near the ground than at higher levels. Use appropriate drift control measures or avoid application when smoke is moving toward nearby desirable susceptible plants or sensitive areas.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures if the forage legume component is substantial and desired. TORDON 22K Weed Killer may injure or kill legumes. Also, new legume seedings may not be successful if made within two years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on an untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie ground water ten feet or less below the surface.

READ AND FOLLOW MIXING AND USE INSTRUCTIONS AND PRECAUTIONS ON PRODUCT CONTAINER LABEL

MINNESOTA .... EPA SLN No. MN-820002

For the Control of Broadleaf Weeds in Rangelands, Permanent Grass Pastures, Spring Barley and Oats, and Spring and Winter Wheat

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Rangeland and Pasture

Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds such as Canada and other thistles, field bindweed, leafy spurge, Russian knapweed, spotted knapweed, bracken fern, goldenrod, and absynth wormwood, yellow toadflax on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays. Retreatment at the same rate may be necessary the following year.

Spot Treatment: (ground application only) Use TORDON 22K at rates of 2 to 4 quarts in 5 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax and knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, apply about 2-1/4 fluid ounces of TORDON 22K in 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

NOTE: When spot treating, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment.

Broadcast Treatment: (ground or aerial application) To suppress the growth of many perennial broadleaf weeds, apply as a broadcast spray using 1 quart of TORDON 22K in 1 to 4 gallons of water per acre by air or in 5 to 100 gallons of water per acre by ground equipment and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.)

Tank Mix for Spot or Broadcast Treatments: TORDON 22K may also be tank mixed with 2,4-D products such as ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4 or ESTERON 6E herbicides for use on areas having mixed species including those which respond well to 2,4-D, such as buckbrush. In tank mix combinations, use 1 pint to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre, in spray volumes specified above. **Read and follow all directions and use precautions on other product labels.**

Spring Barley and Oats, Spring and Winter Wheat not Underseeded with a Legume

For the control of wild buckwheat and other annual broadleaf weeds normally controlled with 2,4-D or MCPA such as wild mustard, Russian thistle, pennycress, lambsquarters and pigweed, in spring wheat and barley and winter wheat, use TORDON 22K as a tank mix with a 2,4-D or MCPA formulation such as DMA 4, FORMULA 40, ESTERON 99 Concentrate, ESTERON 6E, or MCP Amine Herbicides. For use on spring oats, tank mix only with MCP Amine Herbicide. **Read and follow all directions and use precautions on other product labels.**

Spring Wheat, Barley and Oats: Apply during the 3 through 5 leaf stage of growth. Application of TORDON 22K occasionally causes slight head malformations and straw shortening but normally this does not affect yield.

Durum Wheat: Do not treat durum since at least some varieties appear to be more sensitive than other wheat.

Winter Wheat: Apply after resumption of active growth in the spring and before the early boot stage.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air and 5 to 20 gpa by ground. Spray pressure should not exceed 30 psi. Use coarse spray to minimize spray drift.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D or MCPA as outlined in the table. Finally, with continued agitation, add the rest of the water.

The dosages recommended equate to 1/4 oz. picloram + 4 oz. 2,4-D or MCPA ae/acre when weeds are small or 3/8 + 6 oz/acre when weeds are more advanced or when dry soil conditions exist.

Use Rates for Barley, Oats, and Wheat

Weed Growth Stage	Amounts of Each Product Per Acre†		
	TORDON 22K	*plus* DMA 4, FORMULA 40 ESTERON 99 Concentrate or MCP Amine	*or* ESTERON 6E
weeds 1-3 inches tall	1 fl oz	½ pt	⅓ pt
weeds 3-6 inches tall or under dry conditions	1½ fl oz	¾ pt	½ pt

† When measuring small amounts of TORDON 22K weed killer, special care should be taken not to exceed suggested rates

NOTE: Use only on land that will be planted the following year to grass or grain crops such as small grains, corn, sorghum, or flax. Do not apply more than 3/8 ounce picloram per acre during any 12-month period.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent

NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 30 pounds spraying pressures with large droplet producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at the nozzles; by using straight stream nozzles directed straight back; by using a spray boom no longer than 3/4 the wing span of the aircraft; and by spraying only when wind velocity is less than 10 mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near the site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures or grain if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also new legume seedings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pastures. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie ground water 10 feet or less below the surface.

MISSOURI .... EPA SLN NO. MO-790004

For the Control of Musk Thistle, Goldenrod, Ironweed, and other Broadleaf Weeds in Rangeland and Permanent Grass Pastures

GENERAL INFORMATION

Use TORDON 22K Weed Killer to control musk thistle growing in rangeland or permanent grass pastures. Picloram, the active ingredient in TORDON 22K Weed Killer, is highly active, water soluble and has moderate soil residual. Small amounts of TORDON 22K Weed Killer can injure sensitive broadleaf plants. To prevent damage to desirable crops and plants follow all directions on this label.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Broadcast Treatment: To control broadleaf weeds, treat when weeds are growing well and apply broadcast with conventional ground equipment. Do not apply by air or with mist blower.

For control of **musk thistle:** Apply when musk thistle plants are in the rosette stage of growth in the fall from October 1 to soil freeze-up or in the spring before flower stock elongates or "bolts" above the rosette leaves. Use 6 to 8 fluid ounces (3/8 to 1/2 pint) of TORDON 22K in 10 to 20 gallons of water. Generally, most consistent control is received from fall applications.

For control of **goldenrod:** Apply when plants are growing well at the rate of 6 to 8 fluid ounces (3/8 to 1/2 pint) of TORDON 22K in 10 to 20 gallons of water. Best results are obtained with applications made prior to early bud stage.

For control of **ironweed:** Apply when plants are growing well at the rate of 1 pint of TORDON 22K in 10 to 20 gallons of water. For best results, apply prior to early bud stage.

Wick Applications: Mix 1 part of TORDON 22K with 2 parts of water to prepare a 33% solution. Apply when weeds are actively growing and are above most desirable plants. For musk thistle, apply before seed head develops into purple flower for best results. Later applications may not stop early season seed production. For ironweed and goldenrod, best results are obtained with applications made prior to early bud stage.

Wick applicator should be drained and cleaned after each use. Ropes should be changed when flow is reduced from wear, extended use, poor cleaning or intermittent use.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, shade trees, or the soil containing roots of nearby valuable plants.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. To avoid spray drift use low spray pressure, under 30 psi, spray when wind velocity is less than 10 mph, and apply as a coarse spray. Spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using large droplet producing nozzle tips; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce fine-droplet spray. Do not apply to cropland used for production of desirable crops other than forage grasses. Do not rotate treated rangeland or pasture to other crop uses.

Do not treat pasture or rangeland if injury to the forage legume cannot be tolerated. TORDON 22K weed killer may injure or kill forage legumes when exposed to sprays or residues from wicked plants. Also, new legume seedling establishment may not be successful if seeded within 2 years following application of herbicide.

Do Not Contaminate Water intended for irrigation, drinking or other domestic purposes. To avoid crop or other plant injury, do not treat or allow spray drift to fall onto inner banks or bottom of irrigation and drainage ditches.

Do not move treated soil to other areas or use it to grow plants unless adequately sensitive bioassay shows that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass area onto a broadleaf crop area without first allowing 7 days of grazing on an untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not use where a sandy porous surface and substrate overlie ground water 10 feet or less below the surface.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Pesticide Disposal: Pesticide, spray mixture or rinsate that cannot be used according to label instructions must be disposed of according to Federal, state or local procedures under the Resource Conservation and Recovery Act.

Container Disposal: Do not reuse containers. Dispose of them in a sanitary landfill or by other approved state and local authorities.

READ AND FOLLOW MIXING AND USE INSTRUCTIONS AND PRECAUTIONS ON PRODUCT CONTAINER LABEL

MONTANA EPA SLN No. MT-780004

For the Control of Broadleaf Weeds on Non-Cropland

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Use TORDON 22K Weed Killer by ground application to control broadleaf annual and perennial weeds such as Canadian and other thistles, field bindweed, leafy spurge, Russian knapweed, spotted knapweed, tall larkspur, yellow toadflax, locoweed, snakeweed and lupines on non-cropland areas such as on roadside or other rights-of-way, and along fence rows, around farm buildings and outer banks of ditches. Treat when weeds are growing well using low pressure sprays. Retreatment at the same rate may be necessary the following year.

Spot Treatment: Use TORDON 22K at rates of 2 to 4 quarts in 20 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax and

knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, use about 2-1/4 fluid ounces of TORDON 22K per 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

Broadcast Treatment: To suppress the growth of many perennial broadleaf weeds, apply as a broadcast spray using 1 quart of TORDON 22K in 20 to 100 gallons of water per acre and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.)

Tank Mixture for Spot or Broadcast Treatments: TORDON 22K may also be tank mixed with 2,4-D products such as ESTERON® 99® Concentrate, FORMULA 40®, DMA® 4 or ESTERON 6E herbicides for use on areas having mixed species including those which respond well to 2,4-D. In tank mix combinations, use 1 pint to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre, in 20 to 100 gallons of water per acre. **Read and follow all directions and use precautions on other product labels.**

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more.

Spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

The spray thickening agent, NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Do Not Apply When Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near site of application is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

MONTANA EPA SLN NO. MT-780003

For the Control of Broadleaf Weeds in Rangelands, Permanent Grass Pastures, Spring Barley and Oats, and Spring and Winter Wheat

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Rangeland and Pasture

Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds such as Canadian and other thistles, field bindweed, leafy spurge, Russian knapweed, spotted knapweed, tall larkspur, yellow toadflax, locoweed, snakeweed and lupines on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays. Retreatment at the same rate may be necessary the following year.

Spot Treatment: (ground application only) Use TORDON 22K at rates of 2 to 4 quarts in 20 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax and knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, apply about 2-1/4 fluid ounces of TORDON 22K in 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

NOTE: When spot treating, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment.

Broadcast Treatment: (ground or aerial application) to suppress the growth of many perennial broadleaf weeds, apply as a broadcast spray using 1 quart of TORDON 22K in 1 to 4 gallons of water per acre by air or in 20 to 100 gallons of water per acre by ground equipment and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.)

Tank Mixture for Spot or Broadcast Treatments: TORDON 22K may also be tank mixed with 2,4-D products such as ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4 or ESTERON 6E herbicides for use on areas having mixed species including those which respond well to 2,4-D, such as big sagebrush. In tank mix combinations, use 1 pint to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre, in spray volumes specified above. **Read and follow all directions and use precautions on other product labels.**

Spring Barley and Oats, Spring and Winter Wheat not Underseeded with a Legume

For the control of wild buckwheat and other annual broadleaf weeds normally controlled with 2,4-D or MCPA such as wild mustard, Russian thistle, pennycress, lambsquarters and pigweed, in spring wheat and barley and winter wheat, use TORDON 22K as a

tank mix with a 2,4-D or MCPA formulation such as DMA 4, FORMULA 40, ESTERON 99 Concentrate, ESTERON 6E, or MCP Amine Herbicides. For use on spring oats, tank mix only with MCP Amine Herbicide. **Read and follow all directions and use precautions on other product labels.**

Spring Wheat, Barley and Oats: Apply during the 3 through 5 leaf stage of growth. Application of TORDON 22K occasionally causes slight head malformations and straw shortening but normally this does not affect yield.

Durum Wheat: Do not treat durum since at least some varieties appear to be more sensitive than other wheat.

Winter Wheat: Apply after resumption of active growth in the spring and before the early boot stage.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air and 5 to 20 gpa by ground. Spray pressure should not exceed 30 psi. Use a coarse spray to minimize spray drift.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D or MCPA as outlined in the table. Finally, with continued agitation, add the rest of the water.

The dosages recommended equate to 1/4 oz. picloram + 4 oz. 2,4-D or MCPA ae/acre when weeds are small or 3/8 + 6 oz./acre when weeds are more advanced or when dry soil conditions exist.

Use Rates for Barley, Oats, and Wheat

Weed Growth Stage	Amounts of Each Product Per Acre †		
	TORDON 22K *plus*	DMA 4, FORMULA 40 ESTERON 99 Concentrate or MCP Amine *or*	ESTERON 6E
weeds 1-3 inches tall	1 fl. oz	½ pt.	⅓ pt.
weeds 3-6 inches tall or under dry conditions	1½ fl. oz	¾ pt.	½ pt.

† When measuring small amounts of TORDON 22K weed killer, special care should be taken not to exceed suggested rates.

NOTE: Use only on land that will be planted the following year to grass or grain crops such as small grains, corn, sorghum, or flax. Do not apply more than 3/8 ounce picloram per acre during any 12-month period.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent, NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray, by using no more than 30 pounds spray pressure at nozzles, by using straight stream nozzles directed straight back, by using a spray boom no longer than 3/4 the wing span of the aircraft, and by spraying only when wind velocity is less than mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures or grain if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also new legume seedlings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie ground water 10 feet or less below the surface.

NEBRASKA EPA SLN NO. NE-790023

For the Control of Leafy Spurge, Musk Thistle and other Broadleaf Weeds in Rangeland and Permanent Grass Pastures

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and the container label before using.

GENERAL INFORMATION

Use TORDON 22K Weed Killer to control leafy spurge, musk thistle and other broadleaf weeds growing in rangeland or permanent grass pastures. Picloram, the active ingredient in TORDON 22K Weed Killer, is highly active, persistent, and water soluble. To prevent damage to desirable crops and plants follow all directions and precautions on this label.

Treat when weeds are growing well using low pressure sprays. Treat no more than once in any 12-month period and no more than twice in any 3-year period. Do not apply with a mist blower.

For applications at rates greater than 8 fl oz per acre, limit coverage to no more than 10% or 10 acres, whichever is greater, of an operator's acreage found in any particular watershed.

For control of broadleaf annual and perennial weeds such as leafy spurge, Canadian and other thistles, field bindweed, Russian knapweed, spotted knapweed, tall larkspur, locoweed, snakeweed and lupines: (Spot Treatment - Ground Application Only) Use TORDON 22K at rates of 2 to 4 quarts in 5 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax and knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, apply about 2-1/4 fluid ounces of TORDON 22K in 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

NOTE: When spot treating, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment.

(Broadcast Treatment - Ground or Aerial Application) To suppress the growth of many perennial broadleaf weeds, apply as a broadcast spray using 1 quart of TORDON 22K in 1 to 4 gallons of water per acre by air or in 5 to 100 gallons of water per acre by ground equipment and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.)

(Tank Mixture for Spot or Broadcast Treatments) TORDON 22K Weed Killer may also be tank mixed with 2,4-D products such as ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4 or ESTERON 6E Herbicides for use on areas having mixed species including those which respond well to 2,4-D, such as big sagebrush. In tank mix combinations, use 1 pint to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre, in spray volumes specified above. **Read and follow all directions and use precautions on other product labels.**

For control of musk thistle: Use 6 to 8 fluid ounces (3/8 to 1/2 pint) of TORDON 22K in 1 to 4 gallons of water per acre by air or in 10 to 20 gallons of water per acre by ground equipment. Apply in the spring before May 15, or when musk thistle plants are in the rosette stage of growth or before flower stock elongates over 2 inches above leaves, whichever comes first. Apply in the fall after October 1, but before soil freeze-up or December 1, whichever is earlier.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent, NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of a spray per acre; by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at nozzles; by using straight stream nozzles directed straight back; by using a spray boom no longer than 3/4 the wing span of the aircraft; and by spraying only when wind velocity is less than 10 mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near the site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also, new legume seedings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use on flood, gravity, sprinkler, or sub-irrigated land.

Do not use where a sandy porous surface and substrate overlie ground water which may be 15 feet or less below the surface at any time.

NORTH DAKOTA .... EPA SLN NO. ND-780002

For the Control of Broadleaf Weeds in Rangelands, Permanent Grass Pastures, Spring Barley and Oats, Spring and Winter Wheat, and Flax

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Spring Barley and Oats, Spring and Winter Wheat not Underseeded with a Legume

For the control of wild buckwheat, volunteer sunflower and other annual broadleaf weeds normally controlled with 2,4-D or MCPA, such as wild mustard, Russian thistle, pennycress, lambsquarters and pigweed, in spring wheat and barley and winter wheat, use TORDON 22K Weed Killer as a tank mix with a 2,4-D or MCPA formulation such as FORMULA 40*, DMA* 4, ESTERON* 99* Concentrate, ESTERON 6E, MCP Ester, or MCP Amine Herbicides. For use on spring oats, tank mix only with MCP Ester or MCP Amine Herbicide. **Read and follow all directions and use precautions on other product labels.**

Spring Wheat, Barley and Oats: Apply during the 3 through 5 leaf stage of growth. Application of TORDON 22K occasionally causes slight head malformations and straw shortening but normally this does not affect yield.

Durum Wheat: Do not treat durum since at least some varieties appear to be more sensitive than other wheat.

Winter Wheat: Apply after resumption of active growth in the spring and before the early boot stage.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air or 5 to 20 gpa by ground.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D or MCPA as outlined in the table. Finally, with continued agitation, add the rest of the water.

Use Rates for Wheat, Barley and Oats*

Weeds	Weed Growth Stage**	Amounts of Each Product Per Acre		
		TORDON 22K plus	FORMULA 40, DMA 4, ESTERON 99 Concentrate, MCP Ester, or MCP Amine	or ESTERON 6E
More susceptible species such as lambsquarters, pennycress, and wild mustard	1-3 inches	1 fl. oz.	1/2 pt.	1/3 pt.
	3-6 inches	1 1/2 fl. oz.	3/4 pt.	1/2 pt.
Less susceptible species such as volunteer sunflower, wild buckwheat, Russian thistle, pigweed, and top growth supression of Canada thistle	1-6 inches	1 1/2 fl. oz.	3/4 pt.	1/2 pt.

* For oats, tank mix only with MCP amine or MCP Ester Herbicides

** For best results, treat when weeds have 2 to 4 leaves and are actively growing

NOTE: Use only on land that will be planted the following year to grass or grain crops such as small grains, corn, sorghum, or flax. Do not spray a small grain crop more than once with TORDON 22K Weed Killer.

Flax

For control or suppression of wild buckwheat, volunteer sunflower, pigweed and other susceptible broadleaf weeds, treat flax when 2 to 6 inches tall, before buds begin to form. Apply a tank mixture that delivers 1 fluid ounce TORDON 22K plus 1/2 pint MCP Amine herbicide per acre. For best results and crop safety, apply when flax is 2 to 3 inches tall and the weeds are young and growing well. Treat wild buckwheat before it begins to form a vine. For aerial or ground treatment, use enough water dilution to provide adequate spray coverage, usually 1 to 4 gpa by air or 5 to 20 gpa by ground equipment. If seedling foxtail is a problem, DOWPON* M Grass Killer at 1 pound product per acre may be added to the tank mix but risk of crop injury is increased. Observe the higher spray volume requirements for DOWPON M. **Read and follow all directions and use precautions on labels of all products contained in the tank mixture.**

NOTE: The use of some preplant herbicides such as Eptam or Treflan, or the presence of crop stress from drouth, disease or other elements, may increase risk of crop injury and poor weed control from postemergence herbicide treatment. Also, flax varieties may vary in tolerance to herbicides. Do not treat flax unless the possibility of crop injury can be tolerated. Consult local Extension or University Extension Specialists for further information.

Rangeland and Permanent Grass Pastures

Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds such as Canada Thistle and other thistles, field bindweed, leafy spurge, Russian knapweed, spotted and diffuse knapweed, plains or Geyer larkspur, Dalmation and yellow toadflax, locoweed, and lupines on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays. Retreatment at the same rate may be necessary the following year.

SPOT TREATMENT: Use TORDON 22K at rates shown in the table for broadcast treatment and apply in water with sufficient dilution to obtain adequate spray coverage. For perennial weeds, spray the weed infested area plus a 10 foot border around the infestation. Consult the product container label for guidance to prepare spray mixes to spot treat small patches.

BROADCAST TREATMENT: Apply as a broadcast spray on hard to control weeds at rates shown in the following table. Apply the selected rate of TORDON 22K in 5 gallons of total spray volume per acre (water diluent only) by air, or in 20 to 100 gallons of water per acre by ground equipment. For rates exceeding 1 quart of TORDON 22K per acre, the total area treated in a single season should not exceed 25% of a landowner's acreage found in any particular watershed.

WEED SPECIES	RATES OF TORDON 22K PER SPRAYED ACRE**
Diffuse Knapweed Spotted Knapweed Many Seeding annual weeds	1 pint
Plains or Geyer Larkspur* Locoweed* Lupines*	1 quart
Russian Knapweed	2 quarts
Canada Thistle	2 quarts - Fall rosette & prebolt 3 quarts - Any other time
Dalmation Toadflax Yellow Toadflax Field Bindweed	3 quarts
Leafy Spurge*	1 quart - Repeat annually for 3 to 4 years 2 quarts - Treat 2 consecutive years 4 quarts - Follow as needed with spot touchup treatment

* Denotes poisonous plants

** NOTE: When applying more than 1 quart of TORDON 22K per acre, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing for up to two weeks after treatment should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Water Intended for Irrigation or Domestic Purposes. To avoid injury to crops or other desirable plants, do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches or other channels that carry water that may be used for irrigation purposes.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes, and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. A spray thickening agent, such as NALCO TROL(1), may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Application: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: Drift can be lessened by applying a coarse spray; by using no more than 25 pounds spray pressure at nozzles; by using nozzles which do not produce hazardous amounts of fine spray droplets; by using a spray boom no longer than 3/4 of the rotor or wing length; and by spraying only when wind velocity is less than 10 mph, or as required by state regulations.

Determine Air Movement and Direction Before Foliar Application: Use a smoke generator or other means at or near the application site or on aircraft for detection of air movement, air stability or temperature inversions. Such a condition exists when there is little or no wind and air temperature is lower near the ground than at higher levels. Use appropriate drift control measures or avoid application when smoke is moving toward nearby desirable susceptible plants or sensitive areas.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also new legume seedings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto sensitive broadleaf crop areas for 12 months after application or until picloram has disappeared from the soil, without first allowing 7 days of grazing on an untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie ground water 10 feet or less below the surface.

This registration has been issued by the North Dakota State Laboratories Department pursuant to the provisions of section 24(c) of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended.

SOUTH DAKOTA EPA SLN NO. SD-780001

For the Control of Broadleaf Weeds in Rangelands, Permanent Grass Pastures, Spring Barley and Oats, and Spring and Winter Wheat

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Rangeland and Pasture

Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds such as Canadian and other thistles, field bindweed, leafy spurge, Russian knapweed, spotted knapweed, tall larkspur, yellow toadflax, locoweed, snakeweed and lupines on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays. Retreatment at the same rate may be necessary the following year.

Spot Treatment: (ground application only) Use TORDON 22K at rates of 2 to 4 quarts in 20 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax and knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, apply about 2-1/4 fluid ounces of TORDON 22K in 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

NOTE: When spot treating, do not cut grass for feed within 2 weeks after treatment. Meat animals grazing for up to 2 weeks after treatment should be removed from treated areas 3 days prior to slaughter. Do not graze dairy animals on treated areas within 2 weeks after treatment.

Broadcast Treatment: (ground or aerial application) To suppress the growth of many perennial broadleaf weeds, apply as a broadcast spray using 1 quart of TORDON 22K in 1 to 4 gallons of water per acre by air or in 20 to 100 gallons of water per acre by ground equipment and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.)

Tank Mixture for Spot or Broadcast Treatments: TORDON 22K may also be tank mixed with 2,4-D products such as ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4 or ESTERON 6E herbicides for use on areas having mixed species including those which respond well to 2,4-D, such as big sagebrush. In tank mix combinations, use 1 pint to 1 quart of TORDON 22K with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40 or DMA 4, or with 2/3 to 1-1/3 quarts of ESTERON 6E per acre, in spray volumes specified above. **Read and follow all directions and use precautions on other product labels.**

For Control of Musk Thistle: Use 6 to 8 fluid ounces (3/8 to 1/2 pint) of TORDON 22K in 1 to 4 gallons of water per acre by air or in 10 to 20 gallons of water per acre by ground equipment, and apply in the spring or fall when musk thistle plants are in the rosette stage of growth.

Spring Barley and Oats, Spring and Winter Wheat not Underseeded with a Legume

For the control of wild buckwheat and other annual broadleaf weeds normally controlled with 2,4-D or MCPA such as wild mustard, Russian thistle, pennycress, lambsquarters and pigweed in spring wheat and barley and winter wheat use TORDON 22K as a tank mix with a 2,4-D or MCPA formulation such as DMA 4, FORMULA 40, ESTERON 99 Concentrate, ESTERON 6E, or MCP Amine Herbicides. For use on spring oats, tank mix only with MCP Amine Herbicide. **Read and follow all directions and use precautions on other product labels.**

Spring Wheat, Barley and Oats: Apply during the 3 through 5 leaf stage of growth. Application of TORDON 22K occasionally causes slight head malformations and straw shortening but normally this does not affect yield.

Durum Wheat: Do not treat durum since at least some varieties appear to be more sensitive than other wheat.

Winter Wheat: Apply after resumption of active growth in the spring and before the early boot stage.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air and 5 to 20 gpa by ground. Spray pressure should not exceed 30 psi. Use a coarse spray to minimize spray drift.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D or MCPA as outlined in the table. Finally, with continued agitation, add the rest of the water.

The dosages recommended equate to 1/4 oz. picloram + 4 oz. 2,4-D or MCPA ae/acre when weeds are small or 3/8 + 6 oz/acre when weeds are more advanced or when dry soil conditions exist.

Use Rates for Barley, Oats, and Wheat

Weed Growth Stage	Amounts of Each Product Per Acre†		
	TORDON 22K	*plus* DMA 4, FORMULA 40 ESTERON 99 Concentrate or MCP Amine	*or* ESTERON 6E
weeds 1-3 inches tall	1 fl. oz.	½ pt	⅓ pt
weeds 3-6 inches tall or under dry conditions	1½ fl. oz	¾ pt	½ pt

† When measuring small amounts of TORDON 22K weed killer, special care should be taken not to exceed suggested rates.

NOTE: Use only on land that will be planted the following year to grass or grain crops such as small grains, corn, sorghum, or flax. Do not apply more than 3/8 ounce picloram per acre during any 12-month period.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into streams, irrigation ditches, irrigation ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottom of irrigation ditches.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals or shade trees.

Avoid Spray Drift: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray which may not be visible, may severely injure susceptible crops during both growing and dormant periods. Use coarse sprays to minimize drift since, under adverse weather conditions, fine spray droplets may drift a mile or more. The spray thickening agent NALCO-TROL(1), may be used with this product to aid in reducing spray drift. If used, follow all use recommendations and precautions on the product label.

(1)NALCO-TROL - Trademark of NALCO Chemical Company

Ground Equipment: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips; by spraying when wind velocity is low; and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Aerial Application: With aircraft, drift can be lessened by applying a coarse spray; by using no more than 30 pounds spray pressure at nozzles; by using straight stream nozzles directed straight back; by using a spray boom no longer than 3/4 the wing span of the aircraft; and by spraying only when wind velocity is less than 10 mph.

Do Not Apply By Aircraft When An Air Temperature Inversion Exists: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures or grain if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also new legume seedlings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequate sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Where indicated, follow official local container disposal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be sure that use of this product conforms to all applicable regulations.

Do not use where a sandy porous surface and substrate overlie ground water 10 feet or less below the surface.

TEXAS EPA SLN NO. TX-830003

For Control of Annual and Perennial Broadleaf Weeds Such as Field Bindweed in Grainland Between Crops of Small Grains

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read complete use directions and precautions on this label and container label before using.

Use TORDON 22K Weed Killer by ground application to control or reduce infestations of broadleaf annual and perennial weeds such as field bindweed on grainland during the period following crop harvest and prior to planting winter wheat, barley, or oats.

For **reduction of perennial** weeds such as field bindweed, broadcast treat infested areas using 0.5 to 1 pint TORDON 22K tank mixed with 1 to 2 pints ESTERON* 99* Concentrate, FORMULA 40*, DMA* 4 herbicides, or with 1/3 to 2/3 quart ESTERON 6E herbicide in 10 or more gallons of water per acre. To maintain or further reduce perennial weed infestations, treat annually between crops. For best results treat in June or July following small grain harvest, applying the higher rates of TORDON 22K and 2,4-D. Initial treatment alternatively may be made soon after harvesting a fall maturing crop such as grain sorghum or corn. During the next calendar year, retreat the same area with the lower rate of TORDON 22K, preferably in May or June during the fallow period prior to fall planting of the next small grain crop.

Do not treat with TORDON 22K Weed Killer more than once each calendar year. Additional treatment with 2,4-D alone may be made anytime weeds are present with adequate foliage and in good growing condition.

To control volunteer grain or grass weeds that may be present, use cultivation or appropriate grass control herbicides alone or in combination with broadleaf weed control treatments. Consult the University Experiment Station or Extension Service for recommendations to fit local conditions.

Wheat or other small grain crops may be injured when planted at varying periods following application of TORDON 22K Weed Killer. Do not treat with TORDON 22K if the risk of injury to the small grain crop cannot be tolerated.

For long residual control of perennial weeds such as field bindweed, spot treat scattered infestations following use directions on the container label. When using these higher rate treatments of TORDON 22K, do not treat more than 10% of the area of an infested field in one calendar year. Wheat or other small grain crops may be planted in such treated fields, but crop injury in the spot treated areas may occur for one or more seasons after treatment.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state and local authorities.

Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets,
sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, shade trees, or the soil containing roots of nearby valuable plants.

AVOID SPRAY DRIFT. Applications should be made only when there is no hazard from spray drift since very small quantities of the spray, which may not be visible, may severely injure susceptible crops during both growing and dormant periods. To avoid spray drift use low spray pressure, under 30 psi, spray when wind velocity is less than 10 mph, and apply as a coarse spray. The spray thickening agent NALCO-TROL(1) may be used with this product to aid in reducing spray drift. If this thickening agent is used, follow all use recommendations and precautions on the product label.

NALCO-TROL(1) - Trademark of NALCO Chemical Company

Ground Equipment. With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible, by applying 20 gallons or more of spray per acre, by using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce fine-droplet spray.

Do Not Contaminate Water Intended for Irrigation or Domestic Purposes. Do not treat or allow spray drift to fall onto innerbanks or bottom of irrigation ditches, either dry or containing water or other channels that carry water that may be used for irrigation purposes.

Do not move treated soil to other areas where susceptible desirable plants may be exposed and damaged while phytotoxic residues are present.

WYOMING EPA SLN NO. WY-810002

For the Control of Broadleaf Weeds on Land Planted to Spring Barley and Oats, and Spring and Winter Wheat

GENERAL INFORMATION

Use TORDON 22K Weed Killer in a tank mix with a 2,4-D amine or MCPA formulation to control wild buckwheat as well as annual broadleaf weeds normally controlled with 2,4-D such as wild mustard, kochia, Russian thistle, fanweed, and to suppress the perennial broadleaf weed Canada thistle. Picloram, the active ingredient in TORDON 22K Weed Killer, is highly active, persistent, and water soluble. To prevent damage to desirable crops and plants follow all directions and precautions on this label.

USE DIRECTIONS

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For the control of wild buckwheat and other annual broadleaf weeds normally controlled with 2,4-D or MCPA such as wild mustard, Russian thistle, pennycress, lambsquarters, pigweed and the perennial broadleaf weed Canada thistle in spring wheat and barley and winter wheat, use TORDON 22K as a tank mix with a 2,4-D amine or MCPA formulation. For use on spring oats, tank mix only with MCP Amine Herbicide. **Read and follow all directions and use precautions on other product labels.**

SPRING WHEAT, BARLEY AND OATS: Apply during the 3 through 5 leaf stage of growth. Application of TORDON 22K occasionally causes slight head malformations and straw shortening but normally this does not affect yield.

WINTER WHEAT: Apply after resumption of active growth in the spring and before the early boot stage.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air and 5 to 20 gpa by ground. Spray pressure should not exceed 30 psi. Use coarse spray to minimize spray drift.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D or MCPA as outlined in the table. Finally, with continued agitation, add the rest of the water.

The dosages recommended equate to 1/4 oz. picloram + 4 oz. 2,4-D or MCPA ae/acre when weeds are small or 3/8 + 6 oz. ae/acre when weeds are more advanced or when dry soil conditions exist.

Amounts of Each Product Per Acre†

Growth Stage of Small Grain	TORDON 22K	plus 4/lb/gal. 2,4-D Amine
5 leaf or fully tiller stage	1 fl. oz. (30 cc)	½ pt.
Weeds more advanced or under dry conditions	1½ fl. oz. (45 cc)	¾ pt.

† **When measuring small amounts of TORDON 22K Weed Killer, special care should be taken not to exceed suggested rates.**

NOTE: Use only on land that will be planted the following year to grass or grain crops such as small grains, corn, sorghum, or flax. Do not apply more than 3/8 ounce picloram per acre during any 12-month period.

USE PRECAUTIONS

Use this product only as specified on this label. Refer to the product label for 2,4-D amine or MCPA formulation and carefully follow all applicable directions, precautionary information and statements of hazard given on the label affixed to the product container. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

TORDON 22K Weed Killer is highly active against many broadleaf plants. Very small amounts may cause injury to such plants if applied during either growing or dormant periods. Do not apply on or in the vicinity of susceptible crops or desirable plants including alfalfa, beans, grapes, melons, peas, potatoes, safflower, soybeans, sugar beets, sunflower, tomatoes and other vegetable crops, flowers, fruit plants, ornamentals, shade trees nor the soil containing roots of nearby valuable plants. Do not apply on areas which may be planted to such crops or plants within 1 year of application.

AVOID SPRAY DRIFT: Applications should be made only when there is no hazard from spray drift since very small quantities of the spray may severely injure susceptible crops during both growing and dormant periods. To avoid spray drift, use low spray pressure under 30 psi, spray when wind velocity is less than 10 mph, and apply as a coarse spray. A drift control additive may be used at manufacturer's suggested use rates with this product to aid in reducing spray drift. If used follow all use recommendations and precautions on the product label.

AERIAL APPLICATION: With aircraft application, drift can be lessened by using straight stream nozzles directed straight back and by using a spray boom no longer than 3/4 the wing span of the aircraft.

DO NOT APPLY BY AIRCRAFT WHEN AN AIR TEMPERATURE INVERSION EXISTS: Such a condition is characterized by little or no wind and with air temperature lower near the ground than at higher levels. The use of a continuous smoke column at or near the site of application or use of a smoke generating device on the aircraft is suggested to indicate direction and velocity of air movement, and to indicate a temperature inversion by layering of the smoke.

GROUND EQUIPMENT: With ground equipment, spray drift can be lessened by keeping the spray boom as low as possible, by applying up to 20 gallons per acre and using no more than 30 pounds spraying pressure with large droplet producing nozzle tips, by spraying when wind velocity is low, and by stopping all spraying when wind exceeds 10 miles per hour. Do not apply with hollow cone-type insecticide or other nozzles that produce a fine-droplet spray.

Do Not Contaminate Nontarget Areas: To avoid injury to crops or other desirable plants, do not contaminate irrigation ditches or water intended for irrigation or domestic purposes. Do not treat or allow spray drift to fall onto inner banks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes, or other areas where water can run off to adjacent cropland, either planted or to be planted. Do not contaminate water used for drinking or other domestic purposes.

Do not spray grain if the forage legume component is desired: TORDON 22K Weed Killer may injure or kill legumes. Also new legume seeding may not be successful if made within 1 year following application of this herbicide.

DO NOT MOVE TREATED SOIL: Do not go over treated areas with land levelers or move the soil from treated areas to untreated areas by any other means.

Do not store near food, feedstuff, fertilizer, seeds, insecticides, fungicides, or other pesticides.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Rinse emptied container at least 3 or more times, pouring rinse water in spray tank. Dispose of empty containers and surplus contaminated rinse water in a manner that complies with local, state and federal regulations.

Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies.

Be Sure to Follow All Use Precautions Given on This Label and Remember These Key Points: 1. Use only the recommended amounts of these products at the recommended times. 2. Picloram remains active in the soil for extended periods. Treated soil should not be moved out of treated areas. 3. These products are water soluble. They can move with water in surface runoff, or in irrigation and drainage ditches. Do not contaminate water. 4. Spray drift can cause injury to certain crops, ornamentals, trees, and numerous other desirable plants.

SUPPLEMENTAL USE LABELS

CALIFORNIA EPA REGISTRATION NO. 464-323-ZA

For Use on Rangeland and Permanent Grass Pasture

A permit issued by the appropriate County Agricultural Commissioner is required before using this product on grazing lands and all applications of this product shall be made under the direct supervision of employees of a County Agricultural Commissioner or Control and Eradication Unit, Division of Plant Industry, California State Department of Food and Agriculture.

GENERAL INFORMATION

FOR CONTROL OF: Artichoke, Scotch, Golden, Musk, Canada, Beaumont, Wavyleaf, Yellowstar, Purple Star, Iberian, Distaff and Italian thistles; Spotted, Russian, Diffuse and Squarrose knapweeds; Skeletonweed, Camelthorn, Dalmation Toadflax, White and Caroline horsenettle; Biddy Biddy, Leafy Spurge, Field Bindweed, Scotch Broom and Gorse.

CONSULT YOUR COUNTY AGRICULTURAL COMMISSIONER OR EXTENSION WEED SPECIALIST FOR ADDITIONAL INFORMATION ON THIS PROGRAM.

USE DIRECTIONS

TO PREVENT DAMAGE TO BROADLEAF CROPS AND OTHER DESIRABLE PLANTS, FOLLOW CAREFULLY ALL DIRECTIONS, MIXING AND USE INSTRUCTIONS AND PRECAUTIONS ON THE PRODUCT LABEL.

GRAZING RESTRICTIONS: DO NOT graze dairy animals on treated areas within 4 weeks after spot treating with rates higher than 1 quart TORDON 22K per acre. Animals grazing treated areas within 4 weeks after spot treating with rates higher than 1 quart TORDON 22K per acre should be withdrawn from treated areas at least 3 days before slaughtering. During the first growing season after application of TORDON 22K, livestock grazing treated areas should be held at least 7 days on an untreated pasture area before moving to crop areas since urine may contain enough picloram to cause crop injury. Where 2,4-D is used, do not graze dairy animals on treated areas within 7 days after application.

MIXING INSTRUCTIONS: Mix the required amounts of TORDON 22K Weed Killer in the specified amounts of water and apply as a coarse, low pressure spray (less than 30 psi) to weed and brush foliage. If applied by helicopter, use spray pressure under 10 psi. See helicopter application below. **DO NOT APPLY WITH FIXED WING AIRCRAFT.**

For best results, treat when the weeds are growing actively in the spring before full bloom or in the late summer or fall. Treatments during full bloom or seed stage of some weeds may not give good control. DO NOT APPLY to frozen ground nor to wet soil with free water on the surface.

GROUND APPLICATION: When applying TORDON 22K Weed Killer with ground equipment, use coarse, low pressure sprays (20-30 psi) and apply a minimum of 20 gallons of spray per acre. Apply only when weather conditions are favorable for keeping spray on the target area. Do not apply when wind velocity exceeds 7 mph. Do not allow spray drift to contact off-target susceptible plants. Do not apply to areas which have susceptible broadleaf crops, such as potatoes, vegetable crops or legumes, or other desirable broadleaf plants growing within 1/2 mile downwind or within 1/8 mile upwind.

HELICOPTER APPLICATION: All applications by helicopter must be approved by the California Department of Food and Agriculture in addition to the permit to apply TORDON 22K Weed Killer on range and pastureland from the local County Agricultural Commissioner. Applications by helicopter must conform with all applicable state regulations. Additionally, the pilot must have participated in a training session for this program. Aerial applications may be made only when there is little wind and **no hazard from spray drift.** Do not apply by helicopter to areas which have susceptible crops or other valuable plants within one mile downwind or within 1/4 mile upwind.

Equipment must be designed and operated in a manner to minimize spray drift. Spray volume should be 8 gallons or more per acre. Speed of helicopter while spraying must be under 45 mph. Length of spray boom must not exceed 2/3 the span of the rotor. Application should be made using only nozzles equipped with round orifices, 0.059 inch or larger, without swirling devices, directed straight back from line of flight or down as much as 90°. Spraying pressures should be less than 10 psi at the orifice. The sprayer should be equipped with check valves at each nozzle and a suck back or other device to prevent drip after shut-off of boom. Application should be made on a contour or slightly rising flight pattern at levels between 20 and 40 feet above the ground. Treatments should be made only when winds at flight level are from a definite direction and speeds are less than 5 mph. No application should be made above a temperature inversion, nor when temperature five feet (5') above the ground exceeds 80° F.

USE RATES

BROADCAST TREATMENTS: To control yellowstar thistle, distaff and Italian thistles, use 1/4 to 1/2 quart TORDON 22K Weed Killer per acre. To control artichoke thistle, purple star thistle and Iberian star thistle, use 1/2 to 1 quart TORDON 22K Weed Killer per acre. To suppress the growth of other broadleaf perennial weeds, use 1/2 to 1 quart per acre. Apply as a single broadcast spray during any one growing season. Retreat in subsequent years using similar rates. TORDON 22K Weed Killer may be tank mixed with **ESTERON* 99*** Concentrate, **FORMULA 40*, DMA*** 4, or **ESTERON*** 6E Herbicides (2,4-D products) for use on areas having mixed species including those which respond well to 2,4-D. In tank mix combinations, use 1/4 to 1 quart TORDON 22K Weed Killer with 1 to 2 quarts ESTERON 99 Concentrate, FORMULA 40, or DMA 4 or with 2/3 to 1-1/3 quarts ESTERON 6E per acre. NOTE: Where 2,4-D is used, do not graze treated areas by dairy animals within 7 days after application.

SPOT TREATMENTS: For spot treatments of scattered patches of broadleaf weeds, use 1/4 to 4 quarts of TORDON 22K Weed Killer in 100 gallons of water and spray weed foliage uniformly using 100 gallons of spray per treated acre. Refer to the table below for dosage recommendations for different species.

WEEDS TO BE CONTROLLED	RATE OF TORDON 22K per TREATED ACRE
Yellowstar Thistle, Distaff Thistle, Italian Thistle	¼ to ½ quart
Artichoke Thistle, Purple Star Thistle, Iberian Thistle	½ to 1 quart
Scotch Thistle, Golden Thistle, Musk Thistle, Spotted Knapweed, Diffuse Knapweed, Squarrose Knapweed	1 to 2 quarts
Russian Knapweed, Canada Thistle, Field Bindweed, Rush Skeletonweed, Dalmation Toadflax, Scotch Broom, Gorse	2 to 3 quarts
Leafy Spurge, Camelthorn, White Horsenettle, Carolina Horsenettle, Beaumont Thistle, Wavyleaf Thistle	4 quarts

In any one growing season, when using the rate of 2 quarts per acre for spot treating, spray no more than 10 acres of any contiguous 20 acre block, or no more than one half the total area involved; at 3 quarts per acre, spray no more than 7 acres of a 20 acre block or one third of the total area; at 4 quarts per acre, spray no more than 5 acres of a 20 acre block, or one fourth of the total area. On any size area follow these percentages of the total area treated in accordance with the rate used. These rates will provide a maximum of 1/2 pound of picloram per acre on range and pastureland.

For treating small areas, mix the amount of TORDON 22K Weed Killer indicated below for the desired dosage in 1 gallon of water and spray weed foliage thoroughly, covering about 500 square feet.

RATE OF TORDON 22K PER ACRE	AMOUNT OF TORDON 22K PER GALLON OF SPRAY
4 quarts	3 tablespoons (1.5 fl. oz.)
2 quarts	1½ tablespoons
1 quart	2 teaspoons
½ quart	1 teaspoon

Some injury to certain range grasses, particularly smooth bromegrass and western wheatgrass, may occur at the higher use rates. If such injury is unacceptable, do not apply.

NOTE: Do not graze dairy animals on treated areas within 4 weeks after spot treating with rates higher than 1 quart per acre. Animals grazing treated areas within 4 weeks after spot treating with rates higher than 1 quart per acre should be withdrawn from treated areas at least 3 days before slaughtering.

USE PRECAUTIONS

USE THIS PRODUCT ONLY AS SPECIFIED ON THIS LABEL. DO NOT APPLY WHEN WEATHER CONDITIONS FAVOR DRIFT FROM AREAS TREATED.

Do not apply close to desirable plants. TORDON 22K Weed Killer is water soluble and highly active. Do not apply on or near desirable plants nor on ground likely to contain their roots. Such plants include shade trees, ornamentals, flowers, fruit plants, field crops and vegetable crops.

Do not apply on cropland, nor close to ponds, reservoirs, or streams, nor on sites where surface water from heavy rains can be expected to run off to these areas.

Do not move treated soil. Picloram may remain in treated soil for an extended period of time. Do not move treated soil to other areas and do not use it to grow plants.

Do not apply to land used for production of any crop other than forage grasses. Legumes may be killed by sprays containing TORDON 22K Weed Killer and may not grow in treated areas for two years or longer.

Do not allow spray drift. Small amounts of picloram may damage plants if applied during either the growing or dormant period. To avoid spray drift, do not use high pressure sprays. Coarse sprays are less likely to drift. Do not permit spray drift to contact desirable plants nor the soil containing roots of such plants. Spray TORDON 22K Weed Killer only when there is little wind (less than 7 mph) and **no hazard from spray drift.** Do not spray when the wind is blowing towards susceptible crops or ornamental plants.

DO NOT TRANSFER LIVESTOCK from a treated grass area onto a broadleaf crop area without first allowing 7 days of grazing on an untreated pasture. Otherwise, urine may contain sufficient amounts of picloram to cause injury to broadleaf crop plants.

Do not allow spray or spray drift to contaminate water intended for irrigation, drinking, or other domestic uses. Do not apply on inner banks or bottoms of irrigation ditches. Dike around and do not irrigate through treated areas. Do not apply on areas from which surface runoff water may go into cropland, other than areas used for production of forage grasses, nor into streams or ponds supplying irrigation or drinking water. Do not clean containers or application equipment on or near these areas.

OTHER PRECAUTIONS: Do not store near food, feedstuff, fertilizer, seeds, insecticides, fungicides, or other pesticides.

To avoid injury to desirable plants, containers for TORDON 22K Weed Killer should not be reused since small residues of picloram can damage desirable plants. Rinse equipment and containers thoroughly with water and dispose of rinse water by burying in non-croplands away from water supplies. Dispose of containers by punching holes in them and burying with waste. Where required, follow official local container disposal regulations.

BE SURE THAT USE OF THIS PRODUCT CONFORMS TO ALL APPLICABLE REGULATIONS.

COLORADO EPA NO. 464-07098-CO

To Control Broadleaf Weeds in Rangelands, Permanent Grass Pastures

USE DIRECTIONS

Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants. Do not apply aerially when wind exceeds 5 mph or when picloram-susceptible crops or other plants are located within one mile downwind from the application site. Such crops and plants include field beans, soybeans, sunflowers, peas, potatoes, safflower, sugar beets, alfalfa, vegetables, fruit plants, flowers, and ornamentals.

FOR RANGELAND AND PASTURES: Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds including Canadian and other thistles, field bindweed, leafy spurge, Russian Knapweed, tall larkspur, yellow toadflax, locoweed, snakeweed, and lupines on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays.

Spot Treatment: Use TORDON 22K at rates of 2 to 4 quarts in 20 to 100 gallons of water per acre and apply as a spray to the foliage. Use the higher rates to control leafy spurge, larkspur, toadflax, and knapweed. Use the lower rates for bindweed and thistles. For a 1,000 square foot infestation, use about 2 1/4 fluid ounces of TORDON 22K per 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K).

NOTE: During a season, do not use more than 10 gallons of TORDON 22K for any 100 acre area and do not treat more than 20 acres of any 100 acre area. Do not graze dairy animals on treated areas within four weeks after spot treating of rates greater than one quart per acre.

Broadcast Treatment: To suppress the growth of many perennial broadleaf weeds, use 1 quart of TORDON 22K weed killer in 20 to 100 gallons of water per acre and apply as a broadcast spray during the growing season when weeds are growing well. (Many seedling annual weeds can be controlled using 1 pint per acre.) Retreatment at the same rate may be necessary the following year.

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into drainage channels, streams, irrigation ditches, ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottoms of irrigation ditches.

Do not apply on or in the vicinity of sensitive crops or desirable plants including alfalfa, beans, cotton, grapes, melons, peas, potatoes, safflower, sugar beets, sunflower, tobacco, tomatoes, other field and vegetable crops, flowers, fruit plants, ornamentals or shade trees. Do not apply on areas which may be planted at a later time to such crops or plants.

Do not allow spray drift. Do not permit any spray or spray drift to contact desirable plants off the area treated or the soil containing roots of such plants. To avoid spray drift, use low spray pressure, under 30 psi for ground equipment and under 10 psi for aircraft, and apply as a coarse spray. Do not use pressures nor spray nozzles that produce fine droplets which could present a drift hazard. Spray TORDON 22K Weed Killer only when wind velocity is less than 10 mph and **when there is no hazard from spray drift off the target area. Do not spray when the wind is blowing toward susceptible crops or ornamental plants that are closer than one mile from the target area.** Do not spray above an air inversion. Consult local authorities on possible inversion situation.

Do not rotate treated rangeland or pasture to other crop uses.

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also, new legume seedlings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture. Otherwise, urine may contain enough picloram to cause injury to sensitive broadleaf plants.

Do not store near food, feedstuff, fertilizer, seed, insecticides, fungicides, or other pesticides.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies. Where indicated, follow official local container disposal regulations.

Be sure that use of this product conforms to all applicable regulations.

HAWAII EPA NO. 464-07097-HI

For Use in the State of Hawaii to Control Certain Troublesome Woody Plants in Rangelands and Permanent Grass Pastures

RESTRICTED TO PERMIT HOLDERS

USE DIRECTIONS

Use TORDON 22K Weed Killer to control troublesome woody plants such as lantana, melastoma, guava, Java plum, pamakani, cat's claw, Humuula gorse, firebush and hau as well as many other woody plants, broadleaf weeds and vines infesting rangelands and permanent grass pastures in the state of **Hawaii**. Treat anytime during the year when the plants are actively growing.

Spot Treatment: Mix TORDON 22K at the rate of 2 quarts per 100 gallons of water. Add 2 quarts of surfactant to the spray mixture. Apply as a low pressure (10 to 30 psi) spray to thoroughly wet the leaves, stems and trunks of the brush. For smaller amounts of spray mixture, mix 2 1/2 fluid ounces of TORDON 22K and 2 1/2 fluid ounces of surfactant into 4 gallons of water and apply as above.

Re-treat areas in subsequent years as needed.

Broadcast Treatment

Ground Application: Use TORDON 22K at the rate of 2 quarts per 40 to 100 gallons of water per acre. Add 2 quarts of surfactant per 100 gallons of spray mixture. Apply at low pressure (10 to 30 psi) and keep the spray boom as low as possible consistent with good coverage.

Aerial Application: Use TORDON 22K at the rate of 2 quarts per 7 to 12 gallons of water per acre. Add 2 quarts of surfactant per 100 gallons of spray mixture. Conform to the aerial application regulations of the state of Hawaii.

Re-treat areas in subsequent years as needed.

Do not graze dairy animals on treated areas within two weeks after application. Do not slaughter meat animals grazing on treated areas until two weeks have elapsed after application.

Cut Surface Treatments: For the control of firebush, hau, Java plum and guava with trunks of 3 inches in diameter or larger. Use TORDON 22K Weed Killer diluted 1 to 4 in water as directed below.

Tree Injector: Application should be made by injecting 1 milliliter of the diluted solution through the bark at intervals of 3 inches between edges of the injector wound. The injections should completely surround the tree at any convenient height.

Frill or Girdle: Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with the diluted solution.

USE PRECAUTIONS

Do not allow spray drift. TORDON herbicides are highly active. Very small amounts may cause damage to plants if applied during either growing or dormant periods. Do not apply or otherwise permit TORDON 22K or sprays containing it to contact desirable plants such as pineapple, papaya, macadamia, coffee, vegetables, flowers, grapes, fruit trees, ornamentals, tomatoes, potatoes, beans of all types and other valuable broadleaf plants, nor the soil containing roots of nearby valuable plants. Apply TORDON 22K only when there is little or no wind or no hazard from spray drift.

Do not contaminate water. To avoid injury to crops or other desirable plants, do not contaminate irrigation ditches or water intended for irrigation or domestic purposes. Do not treat or allow spray drift to fall onto inner banks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes.

Do not transfer livestock directly from treated areas onto broadleaf crop areas without allowing 7 days on untreated grass pastures. Urine may contain enough picloram to cause crop injury.

Do not use manure from animals grazing treated areas on land used for growing broadleaf crops, ornamentals, orchards or other valuable plants. Manure may contain enough picloram to cause crop injury.

Do not mix with other pesticides except other herbicides in accordance with University of Hawaii suggestions.

Other precautions. Do not store near food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides.

Empty containers. Rinse with water, pour in spray tank. Repeat twice. Dispose of containers by punching holes in them and burying in non-cropland away from water supplies or in approved sanitary land fills.

Cleaning spray equipment. Flush spray tank with water and drain completely. Follow by thorough rinsing of tank, hoses and nozzles with soap and water. Dispose of all wastes by burying in non-cropland away from water supplies.

BE SURE THAT ALL USE OF TORDON 22K WEED KILLER CONFORMS TO LOCAL REGULATIONS.

NEBRASKA EPA No. 464-07083-NE

To Control Broadleaf Weeds on Land Planted to Spring Barley and Spring and Winter Wheat

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Note: Do not apply on or in the vicinity of sensitive crops or desirable plants including *alfalfa, beans, cotton, grapes, melons, peas, potatoes, safflower, sugar beets, sunflower, tobacco, tomatoes, other field and vegetable crops, flowers, fruit plants, ornamentals or shade trees.* **Do not apply on areas which may be planted at a later time to such crops or plants.**

Do not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water. Do not apply where surface water from treated areas can run off to adjacent cropland, either planted or to be planted, or into drainage channels, streams, irrigation ditches, ponds, or wells. Do not clean containers nor application equipment on or near these areas. Do not apply on inner banks or bottoms of irrigation ditches.

Do not allow spray drift. Do not permit any spray or spray drift to contact desirable plants off the area treated or the soil containing roots of such plants. To avoid spray drift, use low spray pressure, under 30 psi for ground equipment and under 10 psi for aircraft and apply as a coarse spray. Do not use pressures nor spray nozzles that produce fine droplets which could present a drift hazard. Spray TORDON 22K Weed Killer only when wind velocity is less than 10 mph and **when there is no hazard from spray drift off the target area. Do not spray when the wind is blowing toward susceptible crops or ornamental plants that are closer than one mile from the target area.** Do not spray above an air inversion. Consult local authorities on possible inversion situation.

Do not rotate treated grain fields to other crop uses.

Do not spray grain if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes. Also, new legume seedlings may not be successful if made within 2 years following application of this herbicide.

Do not move treated soil to other areas. Do not use it to grow plants, unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil.

Do no store near food, feedstuff, fertilizer, seed, insecticides, fungicides, or other pesticides.

Do not re-use containers for TORDON 22K Weed Killer for any purpose. Dispose by punching holes in them and burying with waste or by taking to an approved landfill. Rinse application equipment after use, preferably at least three times with water, and dispose of rinse water in a non-cropland area away from water supplies. Where indicated, follow official local container disposal regulations.

Be sure that use of this product conforms to all applicable regulations.

FOR SPRING BARLEY, SPRING AND WINTER WHEAT NOT UNDER-SEEDED WITH A LEGUME: For the control of wild buckwheat as well as broadleaf weeds normally controlled with 2,4-D such as wild mustard, kochia, Russian thistle, fanweed, lambsquarter, and pigweed, use TORDON 22K Weed Killer as a tank mix only with a 2,4-D amine formulation containing 4 lb acid equivalent per gallon, such as DMA* 4 or FORMULA 40* herbicides.

crops or other plants are located within one mile downwind from the application site. Such crops and plants include field beans, soybeans, sunflowers, peas, potatoes, safflower, sugar beets, alfalfa, vegetables, fruit plants, flowers, and ornamentals.

FOR SPRING BARLEY, SPRING AND WINTER WHEAT NOT UNDER-SEEDED WITH A LEGUME: For the control of wild buckwheat as well as broadleaf weeds normally controlled with 2,4-D such as wild mustard, kochia, Russian thistle, fanweed, lambsquarter, and pigweed, use TORDON 22K Weed Killer as a tank mix only with a 2,4-D amine formulation containing 4 lb acid equivalent per gallon, such as DMA* 4 or FORMULA 40* herbicides.

For aerial or ground treatment, use enough total spray volume to provide adequate spray coverage. Apply 1 to 4 gpa by air and 5 to 20 gpa by ground. Spray pressure should not exceed 20 psi. Coarse sprays are less likely to drift.

NOTE: Do not apply aerially when wind exceeds 5 mph or when picloram-susceptible crops, including field beans, soybeans, peas, potatoes, sugar beets, safflower or alfalfa, are located within one mile downwind from the application site.

To prepare the spray, mix only with water. Add about half the desired amount of water in the spray tank. Then with agitation, add the recommended amount of TORDON 22K and 2,4-D as outlined in the table. Finally with continued agitation, add the rest of the water.

Apply to spring barley and wheat during the period between the 4-leaf and early boot stages of growth. Apply to winter wheat after resumption of active growth in the spring and before the early boot stage.

Do not apply more than 3/8 ounce picloram per acre during any 12 month period.

GROWTH STAGE	AMOUNTS OF PRODUCTS PER ACRE†	
	TORDON 22K + 4 lb/gal 2,4-D Amine	
4 to 6 leaf (weeds small)	1 fl. oz	0.5 pt.
6 leaf to early boot (weeds more advanced or under dry conditions)	1.5 fl. oz	0.75 pt

† When measuring small amounts of TORDON 22K weed killer, special care should be taken not to exceed suggested rates.

The above table equates to 1/4 oz. picloram + 4 oz 2,4-D ae/acre for grains in the 4 to 6 leaf stage and 3/8 + 6 oz/acre for grain beyond the 6 leaf stage or when dry soil conditions exist.

NOTE: Since a specific growing season can be unusually dry and cool, to assure no carry-over problem, use only on land which will be fallowed or replanted to grass or grain crops the following year.

UTAH EPA NO. 464-07069-UT

To Control Broadleaf Weeds in Rangelands, Permanent Grass Pastures

USE DIRECTIONS

Do not apply where spray drift may be a problem due to proximity of susceptible crops or other desirable plants. Do not apply aerially when wind exceeds 5 mph or when picloram-susceptible crops or other plants are located within one mile downwind from the application site. Such crops and plants include field beans, soybeans, sunflowers, peas, potatoes, safflower, sugar beets, alfalfa, vegetables, fruit plants, flowers and ornamentals.

FOR RANGELAND AND PASTURE: Use TORDON 22K Weed Killer to control broadleaf annual and perennial weeds including Canadian and other thistles, field bindweed, leafy spurge, Russian Knapweed, tall larkspur, yellow toadflax, locoweed, snakeweed and lupines on rangeland and permanent grass pastures. Treat when weeds are growing well using low pressure sprays.

Spot Treatment: Use TORDON 22K at rates of 2 to 4 quarts in 20 to 100 gallons of water per acre and apply as a spray to the foliage.

Use the higher rates to control leafy spurge larkspur toadflax and knapweed Use the lower rates for bindweed and thistles For a 1,000 square foot infestation use about 2 1 4 fluid ounces of TORDON 22K per 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K)

NOTE: During a season do not use more than 10 gallons of TORDON 22K for any 100 acre area and do not treat more than 20 acres of any 100 acre area Do not graze dairy animals on treated areas within four weeks after spot treating of rates greater than one quart per acre

Broadcast Treatment: To suppress the growth of many perennial broadleaf weeds use 1 quart of TORDON 22K Weed Killer in 20 to 100 gallons of water per acre and apply as a broadcast spray during the growing season when weeds are growing well (Many seedling annual weeds can be controlled using 1 pint per acre) Retreatment at the same rate may be necessary the following year

USE PRECAUTIONS

Use this product only as specified on this label. Observe any special use and application restrictions and limitations, including method of application and permissible areas of use as promulgated by state or local authorities.

Do Not Contaminate Nontarget Land Areas, Cropland, Water, or Irrigation Ditches. Do not apply directly to standing or running water Do not apply where surface water from treated areas can run off to adjacent cropland either planted or to be planted or into drainage channels streams irrigation ditches ponds or wells Do not clean containers nor application equipment on or near these areas Do not apply on inner banks or bottoms of irrigation ditches

Do not apply on or in the vicinity of sensitive crops or desirable plants including alfalfa beans cotton grapes melons peas potatoes safflower sugar beets sunflower tobacco tomatoes other field and vegetable crops flowers fruit plants ornamentals or shade trees Do not apply on areas which may be planted at a later time to such crops or plants

Do not allow spray drift. Do not permit any spray or spray drift to contact desirable plants off the area treated or the soil containing roots of such plants To avoid spray drift use low spray pressure under 30 psi for ground equipment and under 10 psi for aircraft and apply as a coarse spray Do not use pressures nor spray nozzles that produce fine droplets which could present a drift hazard Spray TORDON 22K Weed Killer only when wind velocity is less than 10 mph and **when there is no hazard from spray drift off the target area. Do not spray when the wind is blowing toward susceptible crops or ornamental plants that are closer than one mile from the target area.** Do not spray above an air inversion Consult local authorities on possible inversion situation

Do not rotate treated rangeland or pasture to other crop uses

Do not spray pastures if the forage legume component is desired. TORDON 22K Weed Killer may injure or kill legumes Also new legume seedlings may not be successful if made within 2 years following application of this herbicide

Do not move treated soil to other areas. Do not use it to grow plants unless adequately sensitive bioassay or chemical tests show that no detectable picloram is present in the soil

Do not transfer livestock from treated grass areas onto broadleaf crop areas without first allowing 7 days of grazing on untreated grass pasture Otherwise urine may contain enough picloram to cause injury to sensitive broadleaf plants

Do not store near food. feedstuff fertilizer seed insecticides fungicides or other pesticides

Do not re-use containers for TORDON 22K Weed Killer for any purpose Dispose by punching holes in them and burying with waste or by taking to an approved landfill Rinse application equipment after use preferably at least three times with water and dispose of rinse water in a non-cropland area away from water supplies Where indicated follow official local container disposal regulations

Be sure that use of this product conforms to all applicable regulations.

WYOMING EPA NO 464-07087-WY

For Control of Certain Weed and Brush Species in Rangelands and Permanent Grass Pastures

USE DIRECTIONS

Use TORDON 22K Weed Killer to control broadleaved perennial weeds such as Canada thistle field bindweed (wild morningglory) leafy spurge Russian knapweed and other rangeland weed and brush species such as fringed sagebrush snakeweed Geyer (plains) larkspur rabbitbrush and pricklypear cactus Treat anytime during the growing season using low pressure (10 to 30 psi) sprays

Spot Treatment Use TORDON 22K at rates of 2 to 4 quarts per acre Use this amount in 20 to 100 gallons of water per acre and apply as a spray to wet foliage Use the higher rates to control leafy spurge and Russian knapweed Use the lower rates for field bindweed and Canada thistle For a 1,000 square foot treatment use 2 1/4 fluid ounces of TORDON 22K per 1 gallon of water (equivalent to 3 quarts per acre of TORDON 22K) NOTE During a single season do not use more than 10 gallons of TORDON 22K for any 100 acre area and do not treat more than 20 acres of any 100 acre area

Broadcast Treatment: For broadcast treatment a permit for aerial and ground application must be obtained from the Wyoming Department of Agriculture To control fringed sagebrush snakeweed Geyer (plains) larkspur rabbitbrush and pricklypear cactus use 1 to 2 pints of TORDON 22K Weed Killer in 20 to 100 gallons of water per acre with ground equipment or 3 to 5 gallons of water per acre aerially Apply only as a single broadcast spray during any one growing season

To control perennial broadleaved weeds such as Canada thistle leafy spurge and Russian knapweed use 2 to 4 quarts of TORDON 22K Weed Killer in 20 to 100 gallons of water per acre with ground equipment or 3 to 5 gallons of water per acre aerially and apply only as a single broadcast spray during any one growing season For mixture with phenoxy herbicides consult University of Wyoming suggestions on mixtures for specific species

USE PRECAUTIONS

Do not allow spray drift. TORDON herbicide is highly active Small amounts may cause damage to plants if applied during either growing or dormant periods Do not apply or otherwise permit TORDON 22K or sprays containing it to contact desirable plants such as vegetables, flowers, grapes fruit trees, ornamentals tomatoes potatoes, beans of all types and other valuable broadleaved plants, nor the soil containing roots of nearby valuable plants Apply TORDON 22K only when there is little or no wind or no hazard from spray drift

Do not contaminate water. To avoid crop or other plant injury, do not treat or allow spray drift to fall onto inner banks or bottom of irrigation and drainage ditches Dike around and do not irrigate through treated areas

Do not move treated soil. Do not go over treated areas with land levelers, cultivation or harvesting equipment, or move the soil by any other means

Do not transfer livestock directly from areas treated in any one growing season onto broadleaved crop areas without allowing 7 days on untreated grass pastures as urine may contain enough picloram to cause crop injury

Do not graze treated areas with dairy animals.

Do not treat pastures containing valuable legumes or those intended for harvesting as hay or to be rotated to broadleaved crops

Do not mix with other pesticides, except phenoxy herbicides in accordance with University of Wyoming suggestions

Other precautions: Do not store near food feedstuff fertilizer, seeds, insecticides fungicides or other pesticides To avoid injury to desirable plants containers and sprayers used for TORDON 22K should not be reused to contain or apply other materials Be sure that all use of TORDON 22K conforms to local regulations

Rinse equipment and containers thoroughly with water and dispose of wastes by burying in non-crop land away from water supplies Containers sould be disposed of by punching holes in them and burying with waste

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Tordon*
22K
weed killer

18011-008-4

87116-C683

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, express or implied, extends to the use of this product contrary to label instruction, or under abnormal conditions, or under conditions not reasonably foreseeable to seller and buyer assumes the risk of any such use

U S Patent No 3,285,925

THE DOW CHEMICAL COMPANY
Midland, MI 48640 U.S.A.

*Trademark of THE DOW CHEMICAL COMPANY

137-1301-83

VELSICOL®

Banvel®
HERBICIDE

DIRECTIONS FOR USE

IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.

E.P.A. Reg. No. 876-25-AA

THIS LABELING MUST BE IN THE POSSESSION OF THE USER AT THE TIME OF PESTICIDE APPLICATION.

1984

SPECIMEN LABEL

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**BEFORE USING BANVEL HERBICIDE
READ AND FOLLOW THE PRECAUTIONS
APPEARING ON THE CONTAINER.**

* * *

IMPORTANT

The following directions apply to all uses of BANVEL herbicide. Additional precautions and restrictions will be found in each specific use section.

Do not contaminate irrigation ditches or water used for domestic purposes.

SENSITIVE CROP PRECAUTIONS: BANVEL herbicide may cause injury to desirable trees and plants, particularly beans, cotton, flowers, fruit trees, grapes, ornamentals, peas, potatoes, soybeans, sunflowers, tobacco, tomatoes and other broadleaf plants when contacting their roots, stems or foliage. These plants are most sensitive to BANVEL herbicide during their development or growing stage. FOLLOW THE PRECAUTIONS LISTED BELOW WHEN USING BANVEL HERBICIDE.

- Do not treat areas where either possible downward movement into the soil or surface washing may cause contact of BANVEL herbicide with the roots of desirable plants such as trees and shrubs.
- Avoid making applications when spray particles may be carried by air currents to areas where sensitive crops and plants are growing. Do not spray near sensitive plants if wind is gusty or in excess of 5 mph and moving in the direction of nearby sensitive crops. However, always make applications when there is some air movement to determine the direction and distance of possible spray drift. Leave an adequate buffer zone between area to be treated and sensitive plants. Coarse sprays are less likely to drift out of the target area than fine sprays. Agriculturally approved drift-reducing additives may be used.
- Do not apply BANVEL herbicide in the vicinity of sensitive crops when the temperature on the day of application is expected to exceed 85°F as drift is more likely to occur.
- Do not use aerial equipment to apply BANVEL herbicide when sensitive crops and plants are growing in the vicinity of area to be treated.
- To avoid injury to desirable plants, equipment used to apply BANVEL herbicide should be thoroughly cleaned (see PROCEDURE FOR CLEANING SPRAY EQUIPMENT on this page) before reusing to apply any other chemicals.

All crop uses of BANVEL herbicide are intended for a normal growing interval between planting and harvest. If this interval is shortened, such as in cover crops that will be plowed under, do not follow up with the planting of a sensitive crop.

Crops growing under stress conditions such as drought, poor fertility, or foliar damage due to hail, wind or insects, can exhibit various injury symptoms that may be more pronounced if herbicides are applied.

Consult your local or state authorities for possible application restrictions and advice concerning these and other special local use situations.

PROCEDURE FOR CLEANING SPRAY EQUIPMENT

The steps listed below are suggested for thorough cleaning of spray equipment following applications of BANVEL herbicide or tank mixes of BANVEL herbicide plus 2,4-D amine.

1) Hose down thoroughly the inside as well as outside surfaces of equipment while filling the spray tank half full of water. Flush by operating sprayer until the system is purged of the rinse water.
2) Fill tank with water while adding 1 quart of household ammonia for every 25 gallons of water. Operate the pump to circulate the ammonia solution through the sprayer system for 15 to 20 minutes and discharge a small amount of the ammonia solution through the boom and nozzles. Let the solution stand for several hours, preferably overnight.
3) Flush the solution out of the spray tank through the boom.
4) Remove the nozzles and screens and flush the system with two full tanks of water.

The steps listed below are suggested for thorough cleaning of spray equipment used to apply BANVEL herbicide as a tank mix with wettable powders (WP), emulsifiable concentrates (EC), or other types of water-dispersible formulations. BANVEL herbicide tank mixes with water-dispersible formulations require the use of a water/detergent rinse.

5) Complete step 1.
6) Fill tank with water while adding 2 lbs. of detergent for every 40 gallons of water. Operate the pump to circulate the detergent solution through the sprayer system for 5 to 10 minutes and discharge a small amount of the solution through the boom and nozzles. Let the solution stand for several hours, preferably overnight.
7) Flush the detergent solution out of the spray tank through the boom.
8) Repeat step 1, and follow with steps 2, 3 and 4.

REFER TO THE CONTAINER LABEL FOR INSTRUCTIONS CONCERNING DISPOSAL OF WASTE AND CLEANING RINSES.

MIXING AND APPLICATION

UNLESS OTHERWISE SPECIFIED UNDER THE INDIVIDUAL USE HEADINGS OF THIS BOOKLET, THE FOLLOWING DIRECTIONS APPLY TO ALL CROP AND NON-CROP USES OF BANVEL HERBICIDE. REFER TO INDIVIDUAL USE SECTIONS FOR ADDITIONAL PRECAUTIONS, RESTRICTIONS, APPLICATION RATES AND TIMINGS.

BANVEL herbicide is a water-soluble formulation that can be applied using water or sprayable fluid fertilizer as the carrier. If a fluid fertilizer is to be used, a compatibility test (see COMPATIBILITY TEST on page 2) should be made prior to tank mixing.

Ground or aerial application equipment which will give good spray coverage of weed foliage should be used. HOWEVER DO NOT USE AERIAL APPLICATION EQUIPMENT IF SENSITIVE CROPS ARE GROWING IN THE VICINITY OF THE AREA TO BE TREATED.

Apply 5 to 50 gallons of diluted spray per treated acre when using ground application equipment, or 3 to 10 gallons of diluted spray per treated acre when using aerial application equipment. Use the higher level of the listed spray volumes when treating dense or tall vegetation. Use coarse sprays.

Select nozzles designed to produce minimal amounts of fine spray particles. Spray with nozzles as close to the weeds as is practical for good weed coverage.

BANVEL herbicide should not be applied during periods of gusty wind or when wind is in excess of 15 mph as uneven spray coverage may occur.

Avoid disturbing (e.g. cultivating or mowing) treated areas for at least 7 days following application.

BAND TREATMENTS

BANVEL herbicide may be applied as a band treatment. Use the formulas below to determine the appropriate rate and volume per treated acre.

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \begin{array}{c}\text{Broadcast}\\ \text{RATE}\\ \text{per treated acre}\end{array} = \begin{array}{c}\text{Band RATE}\\ \text{per treated acre}\end{array}$$

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \begin{array}{c}\text{Broadcast}\\ \text{VOLUME}\\ \text{per treated acre}\end{array} = \begin{array}{c}\text{Band VOLUME}\\ \text{per treated acre}\end{array}$$

COMPATIBILITY TEST

Before mixing in the spray tank, it is advisable to test compatibility by mixing all components in a small container in proportionate quantities (see following table).

Amount of Herbicide to Add to One Pint of Spray Carrier (Assuming Volume is 25 Gallons per Acre)

HERBICIDE FORMULATIONS	RATE PER ACRE	LEVEL TEASPOONS
Dry	1 lb.	1½
Liquid	1 pt.	½

If herbicide(s) do not ball-up or form flakes, sludge, gels, oily films or layers, or other precipitates, then the tested spray mix is compatible. Usually incompatibility in any of the above described forms will occur within 5 minutes after mixing.

If components are incompatible, the use of a compatibility agent is recommended. Rerun the above COMPATIBILITY TEST with a suitable compatibility agent (¼ teaspoon is equivalent to 2 pints per 100 gallons of fluid fertilizer).

GENERAL WEED LIST

This is a general list of weeds which may be treated with BANVEL herbicide in accordance with this label as recommended under the rates and timing sections of the Individual Use Headings. Proper usage of this product will give control or growth suppression of many ANNUAL, BIENNIAL, and PERENNIAL broadleaf weeds, and many WOODY brush and vine species including:

ANNUALS

amaranth, spiny
  (spiny pigweed)
aster, slender
beggarweed, Florida
broomweed, common
buckwheat, tartary
buckwheat, wild
buffalobur
burclover, California
burcucumber
buttercup, roughseed
carpetweed
catchfly, nightflowering
chamomile, corn
chickweed, common
clovers *(annual)*
cockle, corn
cockle, cow
cocklebur, common
croton, tropic
croton, woolly
cucumber, wild
daisy, English
eveningprimrose, cutleaf
fleabane, annual
henbit
jimsonweed
knawel *(German moss)*
knotweed
kochia
ladysthumb
lambsquarters, common
lambsquarters
  (triazine resistant)
mallow, common
mallow, Venice
mayweed
morningglory, ivyleaf
morningglory, tall
mustard, tansy
mustard, wild
mustards *(yellowtops)*
nightshade, black
pennycress, field
  (fanweed, frenchweed, stinkweed)
pepperweed, Virginia
  (peppergrass)
pigweed, prostrate
pigweed, redroot
  (carelessweed)
pigweed, rough
pigweed, smooth
pigweed
  (triazine resistant)
pigweed, tumble
poorjoe
puncturevine
purslane, common
pusley, Florida
ragweed, common
ragweed, giant
  (buffaloweed)
rubberweed, bitter
  (bitterweed)
sesbania, hemp
shepherdspurse
sicklepod
sida, prickly *(teaweed)*
smartweed, green
smartweed, Pennsylvania
sneezeweed, bitter
sowthistle, annual
sowthistle, spiny
spanishneedles
spikeweed, common
spurge, prostrate
spurry, corn
starbur, bristly
sumpweed, rough
sunflower, common *(wild)*
sunflower, volunteer
thistle, Canada *(seedling)*
thistle, Russian
velvetleaf
waterhemp
waterprimrose, winged
wormwood, annual

BIENNIALS

burdock, common
carrot, wild
  (Queen Anne's lace)
cockle, white
eveningprimrose, common
geranium, Carolina
knapweed, diffuse
knapweed, spotted
mallow, dwarf
plantain, bracted
ragwort, tansy
starthistle, yellow
sweetclover
teasel
thistle, bull
thistle, musk
thistle, plumeless

PERENNIALS

*alfalfa
artichoke, Jerusalem
aster, spiny
aster, whiteheath
bedstraw, smooth
bindweed, field
bindweed, hedge
blueweed, Texas
*bursage
  (bur ragweed)
  (povertyweed)
  (lakeweed)
*buttercup, tall
campion, bladder
chickweed, field
chickweed, mouseear
chicory
*clover, hop
cress, hoary *(whitetop)*
*dandelion, common
*dock, broadleaf *(bitter dock)*
dock, curly
dogbane, hemp
*dogfennel *(cypressweed)*
eupatorium, late
  (thoroughwort)
fern, bracken
garlic, wild
goldenrod, Canada
goldenrod, Missouri
goldenweed, common
hawkweed
horsenettle, Carolina
ironweed
knapweed, black
knapweed, Russian
lespedeza
lupine, silvery
mare's tail *(horseweed)*
milkweed, climbing
milkweed, common
milkweed, honeyvine
milkweed, western whorled
nettle, stinging
nightshade, silverleaf
  (white horsenettle)
onion, wild
*plantain, broadleaf
*plantain, buckhorn
pokeweed
ragweed, western
redvine
smartweed, swamp
snakeweed, broom
*sorrel, red *(sheep sorrel)*
sowthistle
sowthistle, perennial
spurge, leafy
sundrop, halfshrub
  (eveningprimrose)
thistle, Canada
toadflax, Dalmatian
trumpetcreeper *(buckvine)*
vetch
waterhemlock
waterprimrose, creeping
*woodsorrel, common yellow
wormwood, common
wormwood, Louisiana
*yankeeweed
yarrow, common

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*Noted perennials may be controlled using BANVEL herbicide at rates lower than those recommended for other listed perennial weeds. (See application rates and timings on pages 8, 9-10, and 11-12.)

WOODY

alder
ash
aspen
mesquite
oak
oak, poison
basswood
beech
birch
blackberry
blackgum
cedar
cherry
chinquapin
condalia, lotebush *(lote)*
cottonwood
creosotebush
cucumbertree
dewberry
dogwood
elm
grape
guava
hawthorn *(thornapple)*
hemlock
hickory
honeysuckle
hornbeam
huckleberry
huisache
ivy, poison
kudzu
locust, black
maple
melaleuca
olive, autumn
olive, Russian
peppertree, Brazil
  (Florida holly, Schinus)
persimmon, eastern
pine
plum, sand *(wild plum)*
poplar
rabbitbrush
redcedar, eastern
rose, McCartney
rose, multiflora
sagebrush, fringed
sassafras
serviceberry
snowberry, western
  (buckbrush)
spicebush
spruce
sumac
sweetgum
sycamore
tarbush
waxmyrtle
willow
witchhazel
yaupon
yucca

FIELD AND SILAGE CORN
(Conventional, Minimum, and no Tillage)

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

Direct chemical contact with corn seed must be avoided. Corn seed should be placed 1½ inches or more below the soil surface if applications are to be made prior to corn emergence. If the corn seeds are less than 1½ inches below the surface, delay application until the corn has spiked.

BANVEL herbicide preemergence treatments do not require mechanical incorporation to become active. To move this herbicide into the weed germination zone, a shallow mechanical incorporation is recommended for applications which are not followed by adequate rainfall or sprinkler irrigation. Cultivations made due to soil crusting should be shallow.

A PREPLANT OR PREEMERGENCE TO EARLY POSTEMERGENCE application may be followed by one POSTEMERGENCE application of BANVEL herbicide during a growing season.

Applications of BANVEL herbicide to corn during periods of rapid growth may result in temporary leaning. Corn will usually become erect within 3 to 7 days. Cultivation should be delayed until after corn is growing normally to avoid breakage.

Prior to the ensilage (milk) stage of the crop, do not harvest or graze corn for dairy or beef feed.

AVOID SPRAY DRIFT: Observe the following precautions in addition to those appearing on pages 1 and 2 when applying POSTEMERGENCE sprays of BANVEL herbicide to corn if sensitive crops are growing nearby:

- Use coarse sprays. Select nozzles which are designed to produce minimal amounts of fine spray particles. Keep the spray pressure below 20 psi and the spray volume at or above 20 gpa unless otherwise required by the manufacturer of drift-reducing nozzles.
- Use drop pipes (drop nozzles) when corn is 8 inches or more in height to direct the spray beneath the lower leaves of the corn and onto the weeds and soil.
- Do not apply BANVEL herbicide sprays when soybeans are growing nearby if:
  1) corn is more than 24 inches tall,
  2) soybeans are more than 10 inches tall,
  3) soybeans have begun to bloom, whichever comes first.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will control many ANNUAL broadleaf weeds or give growth suppression of many PERENNIAL broadleaf weeds commonly found in corn. (Refer to GENERAL WEED LIST on pages 2-3.)

Control of cocklebur, velvetleaf and jimsonweed resulting from a preemergence application may be reduced if conditions such as low temperature or lack of soil moisture cause delayed or deep germination of weeds.

If wild mustards, common sunflower, or velvetleaf are over 5 inches tall or are growing under drought stress at time of application, adding an agriculturally approved surfactant to BANVEL herbicide or tank mixing BANVEL herbicide plus 2,4-D herbicide will improve control. Refer to tank mix treatments on page 5.

PREPLANT USES

For reduced tillage situations, application of BANVEL herbicide may be made before planting to emerged and actively growing broadleaf weeds. Application rate depends on soil texture and organic matter content. Refer to table below. Mechanical incorporation is not required for activation. Avoid disturbing (e.g. cultivating or mowing) treated areas for 7 days.

PREEMERGENCE TO EARLY POSTEMERGENCE USES

Application of Banvel herbicide may be made immediately after planting until corn is no more than 5 inches tall, with the application rate depending on soil texture and organic matter content. For best performance, make application when ANNUAL broadleaf weeds are emerging from the soil.

SOIL TEXTURE	BROADCAST RATE PER TREATED ACRE	
	2½% or less organic matter	more than 2½% organic matter
COARSE SOILS		
sand, sandy loam and loamy sand	*½ pt. (¼ lb. a.i.)	*¾ pt. (⅜ lb. a.i.)
MEDIUM SOILS		
loam, silt loam, silt, sandy clay and sandy clay loam	*¾ pt. (⅜ lb. a.i.)	1 pt. (½ lb. a.i.)
FINE SOILS		
silty clay, silty clay loam, clay loam and clay	*1 pt. (½ lb. a.i.)	1 pt. (½ lb. a.i.)

(Continued next column)

ALL SOILS CONTAINING GREATER THAN 8% ORGANIC MATTER — USE 1 PINT (½ lb. a.i.) PER TREATED ACRE

***Make application after corn and weeds have begun to emerge.**

POSTEMERGENCE USES

Application of BANVEL herbicide may be made any time after weeds have emerged and are actively growing, but before corn is 36 inches tall or 15 days before tassel emergence, whichever comes first. For best performance, make application when weeds are small, less than 3 inches tall. Drop nozzles should be used to direct spray beneath the corn canopy if weeds are covered by the corn leaves. Poor control of some weed species may result if weeds are greater than 12 inches tall at time of application.

BROADCAST RATE PER TREATED ACRE: ½ pint (¼ lb. a.i.)

The addition of an agriculturally approved surfactant will improve wetting and coverage of weed foliage, and improve control of drought stressed weeds. Use drop pipes (drop nozzles) if the crop is taller than 8 inches. Keeping the spray off the corn leaves and out of the whorl will reduce the likelihood of crop injury and improve spray coverage of weed foliage.

OVERLAY (SEQUENTIAL) TREATMENTS

BANVEL herbicide may be applied to ground previously treated with one or more of the following herbicides:

	rates expressed as maximum lbs. a.i. per treated acre
alachlor (Lasso®)	4
atrazine	4
Bicep® (atrazine + metolachlor premix)	4.5
Bronco® (alachlor + glyphosate premix)	5
butylate (Sutan+®)	6
cyanazine (Bladex®)	4
EPTC (Eradicane®)	6
glyphosate (Roundup®)	5
metolachlor (Dual®)	3
paraquat	1
pendimethalin (Prowl®)	2
propachlor (Bexton®, Ramrod®)	6
simazine (Princep®)	4

Read and follow the label of each of the above products for precautionary statements, directions for use and other restrictions.

TANK MIX TREATMENTS

BANVEL herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, and other restrictions.

BANVEL PLUS ATRAZINE: Application maybe made before grasses are 1½ inches tall. Use 1.25-4.0 lbs. a.i. atrazine per treated acre.

BANVEL PLUS BLADEX: Application may be made before grasses are 1½ inches tall and the corn is not beyond the four true leaf stage. Use 1.25-4.0 lbs. a.i. Bladex per treated acre for preemergence treatments or 1.25-2.0 lbs. a.i. Bladex per treated acre for postemergence treatments. AFTER CORN EMERGENCE, USE ONLY THE BLADEX 80W FORMULATION.

BANVEL PLUS DUAL: Application may be made immediately after planting, but before weeds and corn emerge. Make applications only on medium or fine textured soils containing greater than 2-½% organic matter. Use 1.5-3.0 lbs. a.i. Dual per treated acre.

BANVEL PLUS LASSO: Application may be made until grasses reach the two-leaf stage and before corn is greater than 3 inches tall. Applications prior to crop emergence should only be made to fine textured soils containing 3% or more organic matter. Use 1.5-4.0 lbs. a.i. Lasso per treated acre.

BANVEL PLUS PARAQUAT: Application may be made to emerged weeds, but before corn emerges. Use 0.25-1.0 lb. a.i. paraquat per treated acre.

BANVEL PLUS PRINCEP: Application may be made before weeds and corn emerge. Use 2.0-3.0 lbs. a.i. Princep per treated acre.

BANVEL PLUS PROWL: Application may be made immediately after planting, but before grasses and corn emerge. Make applications only on medium or fine textured soils containing greater than 2-½% organic matter. Use 1.0-2.0 lbs. a.i. Prowl per treated acre.

BANVEL PLUS ROUNDUP: Application may be made to emerged weeds, but before corn emerges. Use 1.0-3.0 lbs. a.i. Roundup per treated acre.

BANVEL PLUS 2,4-D: Tank mix ⅛-¼ lb. 2,4-D acid equivalent per treated acre. Use drop pipes (drop nozzles) if the crop is taller than 8 inches. Keeping the spray off the corn leaves and out of the whorl will reduce the likelihood of crop injury and improve spray coverage of weed foliage.

GRAIN SORGHUM (Milo)

IMPORTANT

**OBSERVE ALL PRECAUTIONS ON PAGE 1.
(Including the Reference To Crops
Growing Under Stress)
READ AND FOLLOW MIXING AND
APPLICATION INSTRUCTIONS ON PAGES 1-2.**

Applications of BANVEL herbicide to sorghum during periods of rapid growth may result in temporary leaning of plants or rolling of leaves. These effects are usually outgrown within 10 to 14 days.

Do not graze or feed treated sorghum forage or silage prior to mature grain stage.

Do not apply BANVEL herbicide to sorghum grown for seed production.

Make no more than one application per growing season.

Delay harvest until 30 days after treatment.

WEEDS CONTROLLED

BANVEL herbicide, when applied at the recommended rate for grain sorghum, will control many actively growing ANNUAL broadleaf weeds and will reduce competition from established PERENNIAL broadleaf weeds as well as control their seedlings. (Refer to GENERAL WEED LIST on pages 2-3.)

RATES AND TIMINGS

Application of Banvel herbicide may be made preplant to emerged and actively growing weeds up to 15 days prior to planting. Postemergence application of Banvel herbicide must be made after sorghum is in the 3 leaf stage but before sorghum is 15 inches tall. For best performance, make applications when sorghum is in the 3-5 leaf stage and weeds are small (less than 3 inches tall). Use drop pipes (drop nozzles) if crop is taller than 8 inches. Keeping the spray off the sorghum leaves and out of the whorl will reduce the likelihood of crop injury and improve spray coverage of weed foliage.

BROADCAST RATE PER TREATED ACRE: ½ pint (¼ lb. a.i.)

OVERLAY (SEQUENTIAL) TREATMENTS

BANVEL herbicide may be applied to ground previously treated with one or more of the following herbicides:

Herbicide	**Maximum rate per treated acre (lbs. a.i.)**
alachlor (Lasso®) (Screen®-treated seed)	4
atrazine	3
metolachlor (Dual®) (Concep®-treated seed)	2.5
propazine (Milogard®)	3.2

PREHARVEST USES

For Use Only in the States of Texas and Oklahoma

Application of BANVEL herbicide may be made any time after the sorghum has reached the soft dough stage of development for suppression of weeds. An agriculturally approved surfactant may be used to improve performance.

BROADCAST RATE PER TREATED ACRE: ½ pint (¼ lb. a.i.)

SMALL GRAINS
(NOT UNDERSEEDED TO LEGUMES)

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

If small grains are grown for pasture only, refer to the PASTURE, RANGELAND and NON-CROPLAND section on pages 8-9.

Do not graze or harvest for livestock feed prior to crop maturity.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will control ANNUAL broadleaf weeds commonly found in small grains, such as:

buckwheat, tartary
buckwheat, wild
chamomile, corn
cockle, corn
cockle, cow
cocklebur, common
knawel *(German moss)*
knotweed
kochia
ladysthumb
lambsquarters, common
mallow, common
mustard, tansy
nightshade, black

pigweed, redroot *(carelessweed)*
pigweed, rough
pigweed, tumble
purslane, common
ragweed, common
ragweed, giant *(buffaloweed)*
smartweed, green
smartweed, Pennsylvania
sowthistle, annual
sunflower, common *(wild)*
sunflower, volunteer
thistle, Russian
velvetleaf

BANVEL herbicide and BANVEL herbicide tank mixes will reduce competition from established PERENNIAL broadleaf weeds and control their seedlings. (Refer to GENERAL WEED LIST on pages 2-3.)

THE SPECIAL USE TANK MIX FOR FALL SEEDED WHEAT ONLY allows a higher rate of 2,4-D to be used in combination with BANVEL herbicide. This tank mix treatment may be used for improved performance of difficult-to-control weeds including:

fiddleneck *(tarweed)*
*garlic, wild
gromwell

henbit
*onion, wild

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*Spring applications may not control weeds that develop in the fall. For fall applications, refer to the BETWEEN CROPPING APPLICATIONS section, pages 11-12.

RATES AND TIMINGS

Application of BANVEL herbicide may be made before, during or after planting to emerged and actively growing weeds. See specific crop for timing restrictions. For best performance, make application when weeds are in the 2-3 leaf stage and rosettes are less than 2 inches across. Use the higher level of listed rate ranges when treating more mature weeds or dense vegetative growth.

FALL SEEDED WHEAT

BANVEL HERBICIDE MUST BE APPLIED TO FALL SEEEDED WHEAT PRIOR TO THE JOINTING STAGE.

BROADCAST RATE PER TREATED ACRE:
¼ pint (⅛ lb. a.i.)

TANK MIX TREATMENTS

For control of grasses or additional broadleaf weeds, BANVEL herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:
Apply ⅛-¼ pint (1/16-⅛ lb. a.i.) BANVEL herbicide with:

	amount product*	**lb. a.i.**
2,4-D	½-¾ pint	¼-⅜
MCPA	½-¾ pint	¼-⅜
Bromoxynil	1-1½ pint	¼-⅜
Bromoxynil + MCPA	1 + ½ pint	¼ + ¼
metribuzin		
(Sencor® 75 DF)	⅓ lb.	¼
(Sencor® 4)	½ pint	¼
chlorsulfuron		
(Glean® 75 DF)	⅙-½ wt. oz.	0.008-0.024

*based on 4 pounds per gallon formulations of MCPA and 2,4-D and 2 pounds per gallon formulation bromoxynil.

SPECIAL USE TANK MIX FOR FALL SEEDED WHEAT ONLY

BANVEL	¼ pint	⅛ lb. a. i.
plus	plus	plus
2,4-D amine	1 to 2 pints	½ to 1
or	or	or
2,4-D ester	1 to 1-½ pints	½ to ¾

Note: Do not use unless possible crop injury will be acceptable.

SPRING SEEDED WHEAT

BANVEL HERBICIDE MUST BE APPLIED BEFORE SPRING SEEDED WHEAT EXCEEDS THE 5 LEAF STAGE.

BROADCAST RATE PER TREATED ACRE:
¼ pint (⅛ lb. a.i.)

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-¼ pint (1/16-⅛ lb. a.i.) BANVEL herbicide with:

	amount product*	**lb. a.i.**
2,4-D	½-¾ pint	¼-⅜
MCPA	½-¾ pint	¼-⅜
Bromoxynil	1-1½ pint	¼-⅜
chlorsulfuron (Glean® 75 DF)	⅛-½ wt. oz.	0.008-0.024

*based on 4 pounds per gallon formulations of MCPA, 2,4-D and 2 pounds per gallon formulation of bromoxynil.

FALL SEEDED BARLEY

BANVEL HERBICIDE MUST BE APPLIED TO FALL SEEDED BARLEY PRIOR TO THE JOINTING STAGE. Note: For fall barley varieties that are seeded during the winter months or later, follow the rates and timings given for Spring Seeded Barley.

BROADCAST RATE PER TREATED ACRE:

¼ pint (⅛ lb. a.i.)

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-¼ pint (1/16-⅛ lb. a.i.) BANVEL herbicide with:

	amount product*	**lb. a.i.**
2,4-D	½ pint	¼
MCPA	½-¾ pint	¼-⅜
chlorsulfuron (Glean® 75 DF)	⅛-½ wt. oz.	0.008-0.024

* based on 4 pounds per gallon formulations of MCPA and 2,4-D.

SPRING SEEDED BARLEY

BANVEL HERBICIDE MUST BE APPLIED BEFORE SPRING SEEDED BARLEY EXCEEDS THE 3 LEAF STAGE.

BROADCAST RATE PER TREATED ACRE:

3/16 pint (3/32 lb. a.i.)

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-3/16 pint (1/16-3/32 lb. a.i.) BANVEL herbicide with:

	amount product*	**lb. a.i.**
MCPA	½ pint	¼
chlorsulfuron (Glean® 75 DF)	⅛-½ wt. oz.	0.008-0.024

* based on 4 pounds per gallon formulations of MCPA.

FALL AND SPRING SEEDED OATS

BANVEL HERBICIDE MUST BE APPLIED BEFORE SPRING SEEDED OATS EXCEED THE 5 LEAF STAGE. APPLICATIONS TO FALL SEEDED OATS MUST BE MADE PRIOR TO THE JOINTING STAGE.

BROADCAST RATE PER TREATED ACRE:

¼ pint (⅛ lb. a.i.)

TANK MIX TREATMENTS

For control of additional broadleaf weeds, BANVEL herbicide may be tank mixed with the following herbicides. Read and follow the label of each tank mix product used for precautionary statements, directions for use, weeds controlled and geographic and other restrictions.

BROADCAST RATE PER TREATED ACRE:

Apply ⅛-¼ pint (1/16-⅛ lb. a.i.) BANVEL herbicide with:

	amount product*	**lb. a.i.**
MCPA	½-¾ pint	¼-⅜

* based on 4 pounds per gallon formulations of MCPA.

SUGARCANE

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2

Consult your local or state authorities for possible application restrictions, especially concerning aerial applications and advice concerning special local use situations.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will control many ANNUAL, BIENNIAL and PERENNIAL broadleaf weeds commonly found in sugarcane. (Refer to GENERAL WEED LIST on pages 2-3.)

RATES AND TIMINGS

Application of BANVEL herbicide may be made any time after weeds have emerged and are actively growing but before the close-in stage of sugarcane. Application rates and timings of BANVEL herbicide are given below. Use the higher level of listed rate ranges when treating dense vegetative growth.

WEED STAGE & TYPE	Broadcast rate per treated acre amount	 lbs. a.i.
Annual		
Small, actively growing	½-1 pt.	¼-½
Established weed growth	1-1½ pts.	½-¾
Biennial	1-2 pts.	½-1
Perennial		
Noted (*) Perennials	2-4 pts.	1-2
Other Perennials	4-6 pts.	2-3†

† Application made over the top of actively growing sugarcane may result in crop injury.

When possible, direct the spray beneath the sugarcane canopy in order to minimize the likelihood of crop injury. The use of directed sprays will also aid in maximizing spray coverage of weed foliage.

Retreatments may be made as needed, however, do not exceed a total of 6 pints (3 lbs. a.i.) of BANVEL herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

BANVEL herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, weeds controlled, geographic and other restrictions.

Herbicide	Rates per treated acre (lbs. a.i.)
ametryn (Evik®)	⅖ to 8
asulam (Asulox®)	2 to 3⅓
atrazine	⅖ to 4
dalapon (Dalapon®)	3½ to 8½
2,4-D	½ to 3*

*Application of BANVEL herbicide plus 2,4-D tank mix at the higher listed rate ranges may result in crop injury.

PASTURE, RANGELAND AND NON-CROPLAND AREAS

BANVEL herbicide is recommended for use for pasture, rangeland, general farmstead weed and brush control and for use on non-cropland areas such as fence rows, roadways, rights-of-way (utility, railroad, highway, pipeland), nonselective forest brush control (including site preparation), drainage ditch banks, wasteland and other non-cropland areas.

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

BANVEL herbicide uses described in this section also pertain to small grains such as barley, oats, rye or wheat grown for pasture use only.

NEWLY SEEDED AREAS, including small grains such as barley, oats, rye or wheat grown for pasture, may be severely injured if rates of BANVEL herbicide are applied in excess of those listed for control of ANNUAL weeds.

ESTABLISHED GRASS CROPS growing under stress can exhibit various injury symptoms that may be more pronounced if herbicides are applied. Furthermore, rates of BANVEL herbicide in excess of 2 quarts (2 lbs. a.i.) per treated acre may cause temporary injury to many grass species.

Bentgrass, carpetgrass, buffalograss and St. Augustine grass may be injured at rates exceeding 1 pint BANVEL herbicide (½ lb. a.i.) per treated acre. Usually colonial bentgrasses are more tolerant than creeping types. Velvetgrasses are most easily injured. Treatments will kill or injure alfalfa, clovers, lespedeza, wild winter peas, vetch and other legumes.

REMOVE MEAT ANIMALS FROM TREATED AREAS 30 DAYS PRIOR TO SLAUGHTER.

THERE IS NO WAITING PERIOD BETWEEN TREATMENT AND GRAZING FOR NON-LACTATING ANIMALS.

TIMING RESTRICTIONS FOR LACTATING DAIRY ANIMALS FOLLOWING TREATMENT

BANVEL herbicide Rate per Treated Acre	Days Before Grazing	Days Before Hay Harvest
Up to 1 pint (½ lb. a.i.)	7 days	37 days
Up to 1 quart (1 lb. a.i.)	21 days	51 days
Up to 2 quarts (2 lbs. a.i.)	40 days	70 days
Up to 8 quarts (8 lbs. a.i.)	60 days	90 days

NOTE: Observe all precautions and restrictions on labels of products used in tank mixtures.

MIXING AND APPLICATION

BANVEL herbicide can be applied using water, oil-water emulsions (including invert systems), or sprayable fluid fertilizer as the carrier.

BANVEL herbicide may be applied broadcast using either ground or aerial application equipment. When using ground equipment, apply 10 to 600 gallons of diluted spray per treated acre. Volume of spray applied will depend on the height, density, and type of weeds or brush being treated and on the type of equipment being used. When using aerial equipment, apply 3 to 40 gallons of diluted spray per treated acre.

BANVEL herbicide may be applied to individual clumps or small areas (SPOT TREATMENT) of undesirable vegetation using handgun or similar types of application equipment. Apply diluted sprays to allow complete wetting (up to runoff) of foliage and stems.

ACCUTROL® herbicide adjuvant or other spray additives (emulsifiers, surfactants, wetting agents, drift control agents, or penetrants) may be used for wetting, penetration, or drift control. Spray additives must be agriculturally approved when used in pasture applications. If spray additives are used, read and follow all use recommendations and precautions on product label.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will give control of many ANNUAL, BIENNIAL, and PERENNIAL broadleaf weeds, and many WOODY brush and vine species commonly found in Pasture, Rangeland and Non-Cropland areas. (Refer to GENERAL WEED LIST on pages 2-3.) Noted (*) PERENNIAL weeds may be controlled with lower rates of either BANVEL herbicide or BANVEL herbicide plus 2,4-D. See RATES AND TIMINGS below.

RATES AND TIMINGS

Application rates and timing of BANVEL herbicide are given below. Use the higher level of listed rate ranges when treating dense or tall vegetative growth.

	BANVEL herbicide per treated acre	
WEED STAGE & TYPE	**amount**	**lbs. a.i.**
Annual		
Small, actively growing	½-1 pt.	¼-½
Established weed growth	1-1½ pts.	½-¾
†Biennial		
Rosette diameter		
Less than 3 inches	½-1 pt.	¼-½
3 inches or more	1-2 pts.	½-1
Bolting	2-3 pts.	1-1½
Perennial		
Suppression or top growth control	½-1 qt.	½-1
Noted (*) Perennials	1-2 qts.	1-2
Other perennials	2-4 qts.	2-4
Dense stands	4-6 qts.	4-6
Woody Brush & Vines		
Foliage Suppression	½-1 qt.	½-1
Stems	1-2 qts.	1-2
Stems and Stem Sprouts	½-1 gal.	2-4
Stems and Root Sprouts	1-2 gals.	4-8

†For best performance, make application when BIENNIAL WEEDS are in the rosette stage.

Retreatments may be made as needed; however, do not exceed a total of 2 gallons (8 lbs. a.i.) of BANVEL herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND OTHER RESTRICTIONS. BANVEL herbicide may be tank mixed with one or more of the following herbicides for control of grasses, additional broadleaf weeds, and woody brush and vines.

Herbicide	**Rates Expressed As lbs. a.i. per treated acre**
Pasture, rangeland, and non-cropland use:	
diuron (Karmex®)	4 to 48
glyphosate (Roundup®)	¾ to 3¾
simazine (Princep®)	5 to 40
paraquat	½ to 1
2,4-D	¼ to 6
Rangeland and non-cropland use only:	
picloram (Tordon®)	¼ to 3
2,4,5-T	¼ to 6
Non-cropland use only:	
amitrole	2 to 8
atratol (Atratol®)	4⅘ to 40
bromacil (Hyvar®)	1½ to 24
Oust™	0.14 to 0.56
dalapon (Dalapon®)	4¼ to 12¾
diquat	½
fosamine ammonium (Krenite®)	6 to 12
hexazinone (Velpar®)	2 to 12
MSMA	2
prometon (Pramitol®)	10 to 60
tebuthiuron (Spike®)	1 to 16
triclopyr (Garlon®)	¾ to 9
2,4-DP (Weedone®)	½ to 11

Due to the variations that may occur in formulated products and specific use ingredients (e.g. water supplies), a COMPATIBILITY TEST as described on page 2 is recommended prior to actual tank mixing.

CUT SURFACE TREE TREATMENTS

BANVEL herbicide may be applied as a cut surface treatment for control of unwanted trees and prevention of sprouts of cut trees. A mix of 1 part BANVEL herbicide with 1 to 3 parts water should be used in application. Use the lower dilution when treating difficult-to-control species.

- TREE INJECTIONS*: Injector cuts must penentrate the bark and the sapwood, and should be made completely around tree trunk at intervals of 1 to 2 inches. Apply 1 milliliter of BANVEL herbicide/water mix to each cut.
- FRILL OR GIRDLE TREATMENTS*: Make a continuous cut or a series of overlapping cuts using an axe to girdle tree trunk. Spray or paint cut surface with the BANVEL herbicide/water mix.
- STUMP TREATMENTS: Spray or paint freshly cut surface with the BANVEL herbicide/water mix. The area adjacent to the bark should be thoroughly wet.

*Note: For more rapid foliar effects, 2,4-D may be added to the BANVEL herbicide/water mix.

ASPARAGUS

For Use Only in the States of California, Oregon and Washington

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

If spray contacts emerged spears, crooking (twisting) of some spears may result. If such crooking occurs, discard affected spears.

Do not harvest prior to 24 hours after treatment.

Make only one application per season.

RATES AND TIMINGS

Apply BANVEL herbicide to emerged and actively growing weeds in 40 to 60 gallons of diluted spray per treated acre immediately after cutting the field, but at least 24 hours before the next cutting.

WEEDS	Rate Per Treated acre
mustard, black pigweed, redroot *(carelessweed)* sowthistle, annual *thistle, Canada thistle, Russian	½ to 1 pt. (¼-½ lb. a.i.)
*bindweed, field chickweed, common goosefoot, nettleleaf radish, wild thistle, milk	1 pt. (½ lb. a.i.)

BANVEL herbicide plus 2,4-D herbicide tank mixture may be used for improved control of noted (*) weeds. READ AND FOLLOW 2,4-D PRODUCT LABELING FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS, AND OTHER RESTRICTIONS.

TURF AND LAWNS

Including Golf Course Fairways, Aprons, Tees and Rough.

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

To avoid injury to newly seeded grasses, application of BANVEL herbicide should be delayed until after the second mowing. Furthermore, application rates in excess of 1 pint (½ lb. a.i.) per treated acre may cause noticeable stunting or discoloration of sensitive grass species such as bentgrass, carpetgrass, buffalograss, and St. Augustine grass.

In areas where roots of sensitive plants extend, do not apply in excess of ¼ pint (⅛ lb. a.i.) of BANVEL herbicide per treated acre on coarse textured (sandy-type) soils, or in excess of ½ pint (¼ lb. a.i.) per treated acre on fine textured (clayey-type) soils. Do not make repeat applications in these areas for 30 days and until previous applications of BANVEL herbicide have been activated in the soil by rain or irrigation.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will give control of many ANNUAL, BIENNIAL, and noted (*) PERENNIAL broadleaf weeds commonly found in turf. BANVEL herbicide will also give growth suppression of many other listed PERENNIAL broadleaf weeds and WOODY brush and vine species. (Refer to GENERAL WEED LIST on pages 2-3.)

MIXING AND APPLICATION

Apply 30 to 200 gallons of diluted spray per treated acre (3 qts. to 4¼ gals. per 1,000 sq. ft.), depending on density or height of weeds treated and on the type of equipment used.

RATES AND TIMINGS

Use the higher level of listed rate ranges when treating dense vegetative growth.

	BANVEL herbicide		
WEED STAGE & TYPE	pints per treated acre	lbs. a.i. per treated acre	teaspoons per 1000 sq. ft.
Annual			
Small, actively growing	½-1	¼-½	1-2¼
Established weed growth	1-1½	½-¾	2¼-3¼
Biennial			
Rosette diameter			
Less than 3 inches	½-1	¼-½	1-2¼
3 inches or more	1-2	½-1	2¼-4½
Perennials and Woody Brush and Vines	1-2	½-1	2¼-4½

For best performance, apply when weeds are emerged and actively growing.

Retreatments may be made as needed; however, do not exceed a total of 2 pints (1 lb. a.i.) BANVEL herbicide per treated acre during a growing season.

TANK MIX TREATMENTS

READ AND FOLLOW THE LABEL OF EACH TANK MIX PRODUCT USED FOR PRECAUTIONARY STATEMENTS, DIRECTIONS FOR USE, APPLICATION RATES AND TIMINGS AND OTHER RESTRICTIONS.

Tank mix treatments of BANVEL herbicide may be made with 2,4-D, MCPA, MCPP, or bromoxynil for control of additional weeds listed on the tank mix product label.

Apply 1/5 to 1/2 pint (1/10-1/4 lb. a.i.) of BANVEL herbicide per treated acre with ½ to 1½ lb. acid equivalent of 2,4-D, MCPA, or MCPP, or with ⅜ to ½ lb. a.i. of bromoxynil. Use the higher level of the listed rate ranges when treating established weeds. Repeat treatments may be made as needed; however, do not exceed 2 pints (1 lb. a.i.) of BANVEL herbicide per treated acre during the growing season.

GRASS SEED CROPS

Perennial Grasses such as Bluegrass, Lawntype Fescue and Ryegrass

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

Refer to the PASTURE, RANGELAND, AND NON-CROPLAND IMPORTANT section (pages 8-9) for possible grazing and feeding restrictions.

Do not use on bentgrass unless possible crop injury can be tolerated.

RATES AND TIMINGS

Apply ½ to 2 pints (¼-1 lb. a.i.) of BANVEL herbicide in 5 to 40 gallons of diluted spray per treated acre after weeds have emerged and are actively growing for control of broadleaf weeds such as:

alfalfa
*bindweed, field
catchfly, nightflowering
chamomile, corn
chickweed, common
chickweed, mouseear
clover
cockle, white
dock, curly
*knapweed, Russian
knotweed
sorrel, red *(sheep sorrel)*
starwort, little
*thistle, Canada

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*Top growth control only.

Use ½ to 1 pint (¼-½ lb. a.i.) of BANVEL herbicide per treated acre on SEEDLING GRASS after the crop reaches the 3-5 leaf stage. Up to 2 pints (1 lb. a.i.) of BANVEL herbicide per treated acre may be used on well-established perennial grass. DO NOT APPLY AFTER THE GRASS SEED CROP BEGINS TO JOINT.

For control of ANNUAL GRASS WEEDS such as:

brome, downy *(cheatgrass)*
brome, ripgut
fescue, rattail
hairgrass
oats, wild
windgrass

apply 2 to 4 quarts (2-4 lbs. a.i.) of BANVEL herbicide per treated acre in the fall or late summer after harvest and burning of established grass seed crops. Applications should be made within 3-14 days following first irrigation and before weeds have more than 2 leaves.

BETWEEN CROPPING APPLICATIONS (BCA) FOR BROADLEAF WEED CONTROL

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

WEEDS CONTROLLED

BANVEL herbicide, when applied at the recommended rates, will control many ANNUAL and BIENNIAL broadleaf weeds. (Refer to GENERAL WEED LIST on pages 2-3.) In addition, BANVEL herbicide will control the following PERENNIAL broadleaf weeds:

*alfalfa
artichoke, Jerusalem
bindweed, field
bindweed, hedge
blueweed, Texas
*bursage
  (bur ragweed)
  (povertyweed)
  (lakeweed)
*dandelion, common
*dock, curly
dogbane, hemp
garlic, wild**
horsenettle, Carolina
nightshade, silverleaf
  (whiteweed)
redvine
*sowthistle, perennial
thistle, Canada**
trumpetcreeper *(buckvine)*

*Note: perennials may be controlled using BANVEL herbicide at rates lower than those recommended for other listed perennial weeds. (See RATES AND TIMING section below.)

**See SPECIAL TANK MIX section for specific control program.

RATES AND TIMINGS

Apply BANVEL herbicide as a broadcast or spot treatment to emerged and actively growing weeds after crop harvest and before a killing frost. Agriculturally approved spray additives, such as surfactants or oils, may be used to enhance spray coverage and the herbicide's penetration of weed foliage. See ROTATIONAL CROPS for recommended interval between application and planting to prevent crop injury.

For best performance, make application when ANNUAL weeds are less than 6 inches tall, when BIENNIAL weeds are in the rosette stage, and to PERENNIAL weed regrowth in late summer or fall following a mowing or tillage treatment. Most effective control of upright perennial broadleaf weeds such as Canada thistle and Jerusalem artichoke occurs if application is made when the majority of weeds is 8 inches or taller. Viney perennial broadleaf weeds, such as bindweed and hedge bindweed, are best controlled when weeds are in or beyond the full bloom stage.

Avoid disturbing treated areas for at least 7 days following application. Treatments may not kill weeds which develop from seed or underground plant parts, such as rhizomes or bulblets, after the effective period for BANVEL herbicide. For seedling control, a follow-up program or other cultural practices could be instituted (refer to corn, sorghum and wheat in-crop uses of BANVEL herbicide).

WEED STAGE & TYPE	BANVEL herbicide per treated acre	
	amount	lbs. a.i.
Annual	½-1 pt.	¼-½
Biennial	1-2 pts.	½-1
Perennial		
Noted (*) Perennials	2-4 pts.	1-2
Other Perennials	4 pts.	2

Retreatments may be made as needed; however, do not exceed a total of 4 pints (2 lbs. a.i.) of BANVEL herbicide per treated acre during any given fallow period.

TANK MIX TREATMENTS

BANVEL herbicide may be tank mixed with one or more of the following herbicides for control of grasses or additional broadleaf weeds. Read and follow the label of each tank mix product used for precautionary statements, directions for use, rates and timings, weeds controlled and geographic or other restrictions.

Herbicide	Rate per treated acre (lbs. a.i.)
ANNUAL WEED CONTROL	
atrazine	½ to 3
chlorsulfuron (Glean*)	0.016 to 0.024 (⅓-½ wt. oz. product)
cyanazine (Bladex*)	1⅗ to 3⅕
glyphosate (Roundup*)	¼ to ½
paraquat	½ to 1
2,4-D	¼ to ½
PERENNIAL WEED CONTROL	
glyphosate	1 to 2
2,4-D	1 to 2

SPECIAL TANK MIX TREATMENTS

For wild garlic control, apply 1 pint (½ lb. a.i.) BANVEL herbicide with 1½ lbs. acid equivalent 2,4-D low volatile ester per treated acre. Apply when wild garlic is 4 to 8 inches tall.

For Canada thistle control, use BANVEL herbicide or BANVEL plus Roundup herbicide tank mix treatments.

ROTATIONAL CROPS

The following recommendations are based on BANVEL herbicide use rates up to 4 pints (2 lbs. a.i.) per treated acre.

CORN and SORGHUM may be planted in the spring following applications made during the previous year.

WHEAT may be planted in the fall or spring following applications. Also, spot applications may be made any time prior to crop emergence if crop injury can be tolerated in treated areas. Wheat injury may occur if the interval between application and planting is less than specified.

East of the Mississippi River, the interval is 20 days per pint of BANVEL herbicide per treated acre. Exclude days when ground is frozen.

West of the Mississippi River, the interval is 45 days per pint of BANVEL herbicide per treated acre. Exclude days when ground is frozen.

Following a normal harvest of corn, sorghum, or wheat, any rotational crop may be planted. If the interval before harvest is shortened, such as when cover crops will be plowed under, do not follow up with the planting of a sensitive crop.

CONTROL OF PERENNIAL BROADLEAF WEEDS IN CROPLAND (SPOT APPLICATION ONLY)

For Use Only in the States of Idaho, Montana, Nevada, Oregon, Utah, and Washington.

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGES 1-2.

Do not treat subirrigated cropland or areas where the soil remains saturated with water throughout the year.

Make only one application of BANVEL herbicide per year.

WEEDS CONTROLLED

BANVEL herbicide, when applied at recommended rates, will control many broadleaf weeds including:

bindweed, field
dock, broadleaf *(bitterdock)*
dock, curly
knapweed, black
knapweed, Russian
ragwort, tansy
spurge, leafy
thistle, Canada

RATES AND TIMINGS

BANVEL herbicide may be applied at any time following a crop harvest to stubble fallow or other cropland. Application should be made when weeds are actively growing and prior to a killing frost.

Apply 4 to 6 quarts (4-6 lbs. a.i.) of BANVEL herbicide per treated acre. Application may be made up to one month prior to the planting of wheat. NOTE: Do not use unless injury to wheat or rotated barley will be acceptable.

Barley, oats, corn, sorghum (milo), annual or perennial grass crops may be planted into treated areas one year after application. Crops grown for seed (other than perennial grass seed) should not be planted into treated areas until three years after application. Do not plant broadleaf crops such as alfalfa, beans, peas, potatoes, or sugarbeets into treated areas until two years after application.

In most cases, treatments will not kill perennial weed seedlings which germinate from seed one or two years after treatment. Once the effect of the chemical has been lost, a follow-up program for seedling control or other cultural practices should be instituted.

WIPER APPLICATION USES

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1.

BANVEL herbicide may be applied through wiper application equipment to control or suppress actively growing broadleaf weeds, brush and vines. Use a solution containing 1 part BANVEL herbicide to 1 part water. Do not contact desirable vegetation with herbicide solution. Wiper application should only be made to crops (including pastures) and non-cropland areas described in this label with the exception of Grain Sorghum (Milo).

REGISTERED TRADEMARKS

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24(c) SPECIAL LOCAL NEED LABELING PREHARVEST USES FOR CONTROL OF HEMP DOGBANE IN FIELD CORN AND SORGHUM

For Use Only in the States of
Iowa, Kansas, Michigan, Minnesota, Missouri
Nebraska, Ohio and South Dakota

EPA SLN Nos. IA-760001, KS-790015, MI-830020, MN-830002, MO-810020, NE-790017, OH-810003, SD-790013.

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1.

To prevent possible injury to soybeans growing in the vicinity where applications to corn or sorghum will be made, soybeans must be fully podded and leaves should be turning yellow. Soybeans must be past the bloom stage.

Do not graze or feed fodder from treated areas until 35 days after treatment.

APPLICATION DIRECTIONS

CORN: Apply ¼ pound per acre of BANVEL (equivalent to ½ pint BANVEL HERBICIDE) as a tank mixture with 1 pound per acre 2,4-D acid equivalent basis, as the amine or LV ester formulation after corn is in the brown silk stage. Do not harvest treated corn for at least 7 days after treatment.

SORGHUM: Apply ¼ pound per acre of BANVEL (equivalent to ½ pint BANVEL HERBICIDE) as a tank mixture with 1 pound per acre 2,4-D acid equivalent basis, as the amine or LV ester formulation after sorghum is in soft dough stage. Do not harvest treated sorghum for at least 30 days after treatment.

For best results make application when hemp dogbane is green and underground rhizomes have swollen pink buds.

A non-ionic surfactant may be added to spray mixture.

Observe all applicable directions, restrictions, and precautionary statements on the 2,4-D product label.

For Use Only in the State of Indiana

EPA SLN No. IN-800012

Refer to precautionary statements on previous page and note application directions above. In Indiana, make application from September 15 until the first killing frost. Do not apply near homesteads or residential areas.

24(c) SPECIAL LOCAL NEED LABELING
REDVINE CONTROL
For Use Only in the State of Mississippi

EPA SLN No. MS-780031

IMPORTANT
OBSERVE ALL PRECAUTIONS ON PAGE 1.

Treated areas can only be rotated to the following crops: fall seeded wheat 30 days after application, spring seeded small grains, sorghum, corn, soybeans and cotton the following season.

When tillage is desired, delay for 2 to 7 days after application. This is to allow time for translocation of sufficient BANVEL to the underground parts of the redvine. Actively growing redvine is needed for proper BANVEL translocation; rain, frost or defoliation before 2 to 7 days after application may reduce control.

APPLICATION DIRECTIONS

Apply BANVEL herbicide after final crop harvest, but before a killing frost, but in no event after November 30 at a rate of ½ gal. per acre to the foliage of Redvine *(Brunnichia cirrhosa)*. Dilute with water, use a minimum of 3 gallons diluted spray per acre for aerial applications and 10-40 gallons of diluted spray per acre for ground applications. Add a non-ionic surfactant in accordance with the surfactant label.

24(c) SPECIAL LOCAL NEED LABELING
SMALL GRAINS
AERIAL APPLICATION
For Use Only in the States of Colorado, Montana, Wyoming, Minnesota, North Dakota and South Dakota

EPA SLN Nos.

CO-780032	MN-800008
MT-790004	ND-800002
WY-780011	SD-800001

Refer to the SMALL GRAINS section of this label (pages 6-7) for DIRECTIONS FOR USE information.

BANVEL herbicide may be applied using 1-5 gallons of diluted spray per treated acre when using aerial application equipment in the above listed states only.

24(c) SPECIAL LOCAL NEED LABELING
WILD BUCKWHEAT CONTROL IN FALL SEEDED WHEAT
For Use Only Within the State of Oklahoma

EPA SLN No. OK-810004

IMPORTANT
OBSERVE ALL APPLICATION DIRECTIONS, RESTRICTIONS AND PRECAUTIONS ON PAGES 1, 2 and 6.

TIMING OF APPLICATION: Application of BANVEL herbicide tank mixtures given below can be made on wheat up to the development of a second node. Apply this mixture after the wild buckwheat has emerged and is actively growing. For good control apply before wild buckwheat plants are larger than two true leaves. Spray before a crop canopy is formed which would protect the weeds from the spray.

TANK MIX TREATMENTS: Tank mix 1/16 pound active (⅛ pint) of BANVEL herbicide with ⅛ pound active Bromoxynil plus ⅛ pound active MCPA or with 3/16 pound active Bromoxynil per treated acre. Bromoxynil plus MCPA is sold as Bronate® (trademark of Rhone-Poulenc Inc.) or Brominal® Plus (trademark of Union Carbide Corp.). Bromoxynil is available as Brominal® (trademark of Union Carbide Corp.) or Buctril® (trademark of Rhone-Poulenc Inc.). Read and follow all applicable directions, restrictions, and precautions on the Bromoxynil and MCPA labels.

Dilute with water using a minimum of 3 gallons total spray per acre for aerial application and a minimum of 10 gallons total spray for ground application.

24 (c) SPECIAL LOCAL NEED LABELING
ANNUAL WEED CONTROL IN MILLET

For Use Only
within the State of Nebraska

EPA SLN NO. NE-830009

IMPORTANT
OBSERVE ALL PRECAUTIONS ON PAGE 1.

WEEDS CONTROLLED

ANNUALS

buckwheat, tartary
buckwheat, wild
carpetweed
chamomile, corn
chickweed, common
cockle, corn
cockle, cow
cocklebur, common
dragonhead, American
hempnettle
knawel (German Moss)
knotweed
kochia
ladysthumb
lambsquarters, common
lettuce, prickly
mallow, common
mayweed
mustard, annuals
mustard, tansy
nightshade, black
pennycress, field (fanweed, frenchweed, stinkweed)
pigweed, redroot (careless weed)
pigweed, rough
pigweed, tumble
pineappleweed
puncturevine
purslane, common
radish, wild
ragweed, common
ragweed, giant (buffalo weed)
salsify (goatsbeard)
shepherdspurse
smartweed, green
smartweed, Pennsylvania
sowthistle, annual
starthistle, yellow
sunflower, common (wild)
sunflower, volunteer
thistle, Russian
velvetleaf
vetch

APPLICATION DIRECTIONS

Apply BANVEL herbicide as a broadcast or spot treatment to emerged and actively growing weeds and when millet is in the 2 to 5 leaf stage.

- For control of listed Annual broadleaf weeds, apply ¼ pint BANVEL herbicide (⅛ lb. a.i.) with ⅜ lb. a.i. 2,4-D.

5 to 50 gallons of diluted spray per treated acre may be applied when using ground application equipment, or 3 to 10 gallons of diluted spray per treated acre when using aerial application equipment.

24 (c) SPECIAL LOCAL NEED LABELING
BETWEEN CROPPING SYSTEM USES FOR BROADLEAF WEED CONTROL

For Use Only
within the State of South Dakota

EPA SLN NO. SD-810024

IMPORTANT
OBSERVE ALL PRECAUTIONS ON PAGE 1.

WEEDS CONTROLLED

ANNUALS

buckwheat
buffalobur
catchfly, nightflowering
chickweed, common
cocklebur, common
cockle, corn
cockle, cow
henbit
knotweed
kochia
ladysthumb
lambsquarters, common
mayweed
morningglory, ivyleaf
morningglory, tall
mustards, yellowtops
pennycress, field
pigweed, redroot
pigweed, tumble
ragweed, common
ragweed, giant (buffaloweed)
smartweed, Pennsylvania
sowthistle, annual
sowthistle, spiny
sunflower
thistle, Russian (tumbleweed)

BIENNIALS

starthistle, yellow
teasel
thistle, bull
thistle, musk

PERENNIALS

bindweed, field
blueweed, Texas
bursage, skeletonleaf (bur ragweed, povertyweed)
bursage, woollyleaf (lakeweed)
dock, curly
garlic, wild
nightshade, silverleaf (whiteweed)
redvine
sowthistle, perennial
thistle, Canada
trumpetcreeper (buckvine)

APPLICATION DIRECTIONS

Apply BANVEL herbicide as a broadcast or spot treatment to emerged and actively growing weeds after crop harvest and before a killing frost. Ground or aerial application equipment which will give good spray coverage of weed foliage may be used. Apply 5 to 40 gallons of diluted spray per treated acre when using ground application equipment, or 3 to 10 gallons of diluted spray per treated acre when using aerial application equipment. Spray additives, such as surfactants or oils, may be used to enhance spray coverage and herbicide's penetration of weed foliage.

- For control of ANNUAL broadleaf weeds, apply ½ to 1 pint per acre of BANVEL herbicide. For best results, make application when weeds are less than six inches tall.
- For control of BIENNIAL broadleaf weeds, apply 1 to 2 pints per acre of BANVEL herbicide. For best results, make application when weeds are in the rosette stage.
- For control of PERENNIAL broadleaf weeds, apply 2 to 4 pints per acre of BANVEL herbicide. (See ROTATIONAL CROPS for appropriate interval between application and planting to prevent crop injury.)

Use the higher level of the listed rate ranges when treating dense weed growth. Avoid disturbing treated areas for 7 days following application. These treatments may not kill weeds which develop from seed or underground plant parts, such as rhizomes or bulblets, after the effective period for BANVEL herbicide. A follow-up program for seedling control or other cultural practices should be instituted. Repeat treatments with BANVEL herbicide may be made during the season to control regrowth, however, do not exceed 4 pints per acre during any given fallow period.

TANK MIX TREATMENTS

BANVEL herbicide may be applied as a tank mix treatment with 2,4-D amine or LV ester formulations for control of additional broadleaf weed species. Tank mix treatments with Roundup® Herbicide (registered trademark of Monsanto Agricultural Products Co.) may be made for control of grasses and additional broadleaf weeds. Read and follow all applicable directions, restrictions, and precautionary statements on the 2,4-D or Roundup Herbicide product labels.

ANNUAL GRASS AND ANNUAL BROADLEAF WEED CONTROL

For **ANNUAL** grass and **ANNUAL** broadleaf weed control during fallow periods, tank mix ¼ to 1 pint per acre of BANVEL herbicide with ¼ to 1 pint per acre of Roundup Herbicide. Add 0.5% by volume of an agriculturally approved NONIONIC surfactant, such as X-77 (registered trademark of Kalo Laboratories), to the spray solution. Use ¼ pint per acre of BANVEL plus ¼ pint per acre of Roundup for control of foxtails, kochia, redroot pigweed, Russian thistle, lambsquarter, wild and tame sunflower when these weeds are actively growing and less than 4 inches tall. Use higher rates for larger weeds, weeds under drought stress or other weed species. For ground and aerial applications, use 3 to 10 gallons of water per acre.

PERENNIAL BROADLEAF WEED CONTROL

For control of PERENNIAL broadleaf weeds such as field bindweed and Canada thistle, tank mix 1 to 4 pints per acre of BANVEL herbicide with 2 to 4 pints per acre of Roundup Herbicide. In situations where a short waiting interval requires the low rates of BANVEL herbicide (See ROTATIONAL CROPS below), tank mix with the higher listed rates of Roundup Herbicide.

ROTATIONAL CROPS

- CORN may be planted in areas treated with up to 1 pint per acre of BANVEL anytime after spray application. CORN may be planted in areas treated with higher rates (up to 2 quarts per acre) of Banvel if spray applications were made during the previous year.
- SORGHUM may be planted in areas treated with up to ½ pint per acre of BANVEL anytime after spray application. SORGHUM may be planted in areas treated with higher rates (up to 2 quarts per acre) of BANVEL if spray applications were made during the previous year.
- WINTER WHEAT, SPRING WHEAT, BARLEY and OATS may be planted in areas treated with up to ¼ pint of BANVEL anytime prior to planting. If BANVEL rates exceed ¼ pint per acre, delay planting for 20 days for each ½ pint per acre of BANVEL used to avoid crop injury. Exclude days when ground is frozen.

NOTE: SPOT APPLICATIONS MAY BE MADE ANYTIME PRIOR TO CROP EMERGENCE IF CROP INJURY CAN BE TOLERATED IN TREATED AREAS.

24 (c) SPECIAL LOCAL NEED LABELING

DORMANT SPOT CONCENTRATE AND LO-OIL BASAL BARK APPLICATIONS FOR MULTIFLORA ROSE CONTROL

For Use Only
within the States of Ohio
and West Virginia
EPA SLN Nos. OH-830011, WV-830008

IMPORTANT

OBSERVE ALL PRECAUTIONS ON PAGE 1. READ AND FOLLOW MIXING AND APPLICATION INSTRUCTIONS ON PAGE

APPLICATION INSTRUCTIONS

APPLICATION SITES: BANVEL herbicide may be used to control multiflora rose in PASTURE, RANGELAND, along DRAINAGE DITCH BANKS, RIGHTS-OF-WAY (Utility, Railway, Highway, Pipeline), GENERAL FARMSTEAD AND NON-CROPLAND AREAS SUCH AS FENCE ROWS, ROADWAYS AND OTHER WASTELAND.

MODE OF ACTION: BANVEL herbicide's active ingredient, dicamba, is readily absorbed by roots, stems and leaves and translocates throughout the plant for complete kill. It controls stems, stem sprouts and root sprouts to prevent further spreading of Multiflora rose plants.

TIMING OF APPLICATION: BANVEL herbicide can be applied when plants are dormant as an undiluted SPOT-CONCENTRATE directly to the soil or as a LO-OIL BASAL BARK treatment using an oil-water emulsion solution.

MIXING AND APPLICATION

SPOT CONCENTRATE applications of BANVEL herbicide should be applied directly to the soil as close as possible to the root crown but within 6-8 inches of the crown. On sloping terrain, application should be made to the up-hill side of the crown. Do not make application when snow or water prevents applying BANVEL herbicide directly to the soil.

LO-OIL BASAL BARK applications of BANVEL herbicide should be applied to the basal stem region from the ground line up to a height of 12-18 inches. Spray until runoff, with special emphasis on covering the root crown. For best results, make application when plants are dormant. Do not make application after bud break or when plants are showing signs of active growth. Do not make application when snow or water prevents applying BANVEL herbicide to the ground line.

NOTE: To prepare oil in water emulsions, half fill spray tank with water plus appropriate amount of herbicide. With continuous agitation, slowly add a premix of oil plus a suitable emulsifier to the spray tank. Complete filling of spray tank with water. Maintain vigorous agitation during spray operation to prevent oil and water from forming separate layers.

APPLICATION RATES

SPOT CONCENTRATE TREATMENT

Canopy diameter (feet)	BANVEL herbicide (ounces)
5	¼
10	1
15	2¼

Do not exceed a total of 2 gallons (8 lbs. a.i.) of BANVEL herbicide per acre per year.

LO-OIL BASAL BARK TREATMENT Mix the appropriate amount of BANVEL herbicide with the appropriate amount of water, emulsifier and No. 2 diesel fuel to obtain the volume of spray desired. See table below. Refer to MIXING AND APPLICATION section before mixing. Do not exceed 30 gallons of spray solution per acre per year.

Volume of spray solution desired (gal.)	ounces			
	water	emulsifier	Banvel	#2 Diesel Fuel
1	100*	½	8	20
2	200	1	16	40
5	500	2½	40	100
10	1000	5	80	200

*Conversion: 100 ounces = 3 quarts

RODEO®

HERBICIDE BY Monsanto

For broad-spectrum control of emerged weeds.

Complete Directions for Use

EPA Reg. NO 524-343

AVOID CONTACT WITH FOLIAGE, GREEN STEMS, OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, SINCE SEVERE INJURY OR DESTRUCTION MAY RESULT.

*RODEO is a registered trademark of Monsanto Company

1982-2 A-892.38-000.01 / 53

U.S. Pat. No. 3,799,758 covers use.
Other patents are pending.

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

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MONSANTO COMPANY
AGRICULTURAL PRODUCTS
ST. LOUIS, MISSOURI, 63167 U.S.A.

Read the entire label.

Use only according to label instructions.

NOT FOR REFORMULATION OR REPACKAGING.

Read "LIMIT OF WARRANTY AND LIABILITY" before buying or using.

If terms are not acceptable, return at once unopened.

LIMIT OF WARRANTY AND LIABILITY

This company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this company, including but not limited to incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather (i weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied with the normal range being determined on the basis of the average range for the prior 40 years computed from the best available information, and ii. weather perils, including but not limited to hurricanes, tornadoes and floods) as well as weather considerations set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

The buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

PRECAUTIONARY STATEMENTS

Hazard to Humans and Domestic Animals

Keep out of reach of children.

CAUTION!

MAY CAUSE EYE IRRITATION.

Avoid contact with eyes, skin or clothing.

FIRST AID: IN CASE OF EYE CONTACT, flush with plenty of water for at least 15 minutes. Call a physician.

Physical or Chemical Hazards

Solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Environmental Hazards

Do not contaminate water by disposal of waste or cleaning of equipment.

In case of:

SPILL or LEAK, soak up and remove to a landfill.

Storage and Disposal

STORE ABOVE 10°F (−12°C) TO KEEP FROM CRYSTALIZING. Crystals will settle to the bottom. If allowed to crystalize, place in a warm room 68°F (20°C) for several days to redissolve and mix well before using.

Do not contaminate water, foodstuffs, seed or feed by storage or disposal.

This product, spray mixture or rinsate that cannot be used or chemically reprocessed should be disposed of according to applicable federal, state or local procedures.

Triple rinse container. Then dispose of in a sanitary landfill, or by incineration if allowed by state and local authorities. Do not reuse container.

Consult federal, state or local disposal authorities for approved alternative procedures.

ACTIVE INGREDIENT	
*Isopropylamine salt of glyphosate	53.5%
INERT INGREDIENTS	46.5%
	100.0%

Contains 648 grams per litre or 5.4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon. Equivalent to 480 grams per litre or 4 pounds per U.S. gallon of the acid glyphosate.

GENERAL INFORMATION

This herbicide, a water soluble liquid, mixes readily with water and nonionic surfactant to be applied as a foliage spray for the control or destruction of most herbaceous plants. It may be applied through most standard industrial or field type sprayers after dilution and thorough mixing with water and surfactant in accordance with label instructions.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow down activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above ground growth and deterioration of underground plant parts.

Unless otherwise specified on this label delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "Weeds Controlled" section of this label.

Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the spray and will continue to grow. For this reason best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when (1) weed growth is heavy or dense, or (2) weeds are growing in an undisturbed (non-cultivated) area.

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result Reduced results may also occur when treating weeds heavily covered with dust

Reduced control may result when applications are made to any weed or brush species that have been mowed. grazed. or cut. and have not been allowed to regrow to the recommended stage for treatment

Rainfall or irrigation occuring within 6 hours after application may reduce effectiveness Heavy rainfall or irrigation within 2 hours after application may wash the chemical off the foliage and a repeat treatment may be required

This herbicide does not provide residual weed control For subsequent residual weed control follow a label-approved herbicide program Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used

THE USE OF A NONIONIC SURFACTANT APPROVED FOR THE SITE OF THE DESIRED APPLICATION IS REQUIRED FOR USE WITH THIS PRODUCT Use ¼ to ½ percent surfactant by total spray volume Carefully observe all cautionary statements and other information appearing on the surfactant label

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this herbicide or other materials that are not expressly recommended in this labeling Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance

For best results spray coverage should be uniform and complete Do not spray weed foliage to the point of runoff

ATTENTION

AVOID DRIFT EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS

Do not allow the herbicide solution to mist drip drift or splash onto desirable vegetation since minute quantities of this herbicide can cause severe damage or destruction to the crop plants or other areas on which treatment was not intended The likelihood of plant or crop injury occuring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions including lesser wind velocities will allow spray drift to occur When spraying avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE

NOTE Use of this product in any manner not consistent with this label may result in injury to persons animals or crops or other unintended consequences When not in use keep container closed to prevent spills and contamination

Clean sprayer and parts immediately after using this product by thoroughly flushing with water

MIXING AND APPLICATION INSTRUCTIONS

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES DO NOT APPLY UNDER WIND OR OTHER CONDITIONS WHICH ALLOW DRIFT TO OCCUR HAND GUN APPLICATIONS SHOULD BE PROPERLY DIRECTED TO AVOID SPRAYING DESIRABLE PLANTS NOTE REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED such as WATER FROM PONDS AND UNLINED DITCHES

MIXING

This product mixes readily with water Mix spray solutions of this product as follows fill the mixing or spray tank with the required amount of water while adding the proper amount of this product (see "Directions for Use" and "Weeds Controlled" sections of this label) Near the end of the filling process add the required surfactant and mix well Remove hose from tank immediately after filling to avoid siphoning back into the carrier source During mixing and application foaming of the spray solution may occur To prevent or minimize foam avoid the use of mechanical agitators place the filling hose below the surface of the spray solution terminate by-pass and return lines at the bottom of the tank and if needed use an approved anti-foam or defoaming agent

Keep by-pass line on or near bottom of tank to minimize foaming Screen size in nozzle or line strainers should be no finer than 50 mesh Carefully select proper nozzle to avoid spraying a fine mist For best results with conventional ground application equipment use flat fan nozzles Check for even distribution of spray droplets

APPLICATION EQUIPMENT AND TECHNIQUES

■ AERIAL EQUIPMENT ■

DO NOT APPLY THIS PRODUCT BY AIR IN CALIFORNIA

Use the recommended rates of this herbicide in 3 to 20 gallons of water per acre unless otherwise specified on this label See "WEEDS CONTROLLED" section of this label for specific rates Aerial applications of this product may only be made as specifically recommended on this label

Coarse sprays are less likely to drift therefore do not use nozzles or nozzle configurations which dispense spray as fine spray droplets Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure

Drift control additives may be used When a drift control additive is used read and carefully observe the cautionary statements and all other information appearing on the additive label

Ensure uniform application — To avoid streaked uneven or overlapped application use appropriate marking devices

Thoroughly wash aircraft especially landing gear after each day of spraying to remove residues of this product accumulated during spraying or from spills PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART LANDING GEAR ARE MOST SUSCEPTIBLE The maintenance of an organic coating (Paint) which meets aerospace specification MIL-C-38413 may prevent corrosion

■ BOOM EQUIPMENT ■

For control of weed or brush species listed on this label using conventional boom equipment — Use the recommended rates of this product and surfactant in 3 to 20 gallons of water per acre as a broadcast spray except as indicated on this label See "Weeds Controlled" section of this label for specific rates As density of weeds increase spray gallonage should be increased within the recommended range to insure complete coverage Carefully select proper nozzle to avoid spraying a fine mist For best results with ground application equipment use flat fan nozzles Check for even distribution of spray droplets

■ HAND-HELD and HIGH-VOLUME EQUIPMENT ■

Use coarse sprays only

For control of weeds listed on this label using knapsack sprayers or high volume spraying equipment utilizing handguns or other suitable nozzle arrangements — Unless otherwise specified make a ¾ percent solution of this product in water add surfactant and apply to foliage of vegetation to be controlled For best results use a 1½ percent solution on harder-to-control perennials such as bermudagrass dock field bindweed hemp dogbane milkweed and Canada thistle

Applications should be made on a spray-to-wet basis Spray coverage should be uniform and complete Do not spray to point of runoff

Prepare the desired volume of spray solution by mixing the amount of this product in water shown in the following table

Spray solution

DESIRED VOLUME	AMOUNT OF RODEO®			
	¾%	1%	1¼%	1½%
1 gallon	1 oz	1⅓ oz	1⅔ oz	2 oz
25 gallons	1½ pt	1 qt	1¼ qt	1½ qt
100 gallons	3 qt	1 gal	1¼ gal	1½ gal

2 tablespoons = 1 ounce

For use in knapsack sprayers it is suggested that the proper amount of this product be mixed with water in a larger container Fill sprayer with the mixed solution

WEEDS CONTROLLED

CONTROL OF ANNUAL WEEDS

Apply to actively growing annual grasses and broadleaf weeds Use 1½ pints of this product plus ¼ to ½% nonionic surfactant per acre if weeds are less than 6 inches tall If weeds are over 6 inches tall apply 2½ pints of this product plus ¼ to ½% surfactant per acre Allow at least 3 days after application before disturbing treated vegetation After that period the weeds may be mowed tilled or burned See "Application Equipment and Techniques" for specific volumes of water

When applied as directed under the conditions described in this label this product plus nonionic surfactant WILL CONTROL the following ANNUAL WEEDS

Barley Hordeum vulgare	**Panicum** Panicum spp

Bluegrass (annual)
Poa annua

Brome (downy)
Bromus tectorum

Cocklebur
Xanthium pensylvanicum

Corn (volunteer)
Zea mays

Crabgrass
Digitaria spp.

Falseflax (smallseed)
Camelina microcarpa

Fiddleneck
Amsinckia spp.

Fleabane
Erigeron spp.

Foxtail
Setaria spp.

Kochia
Kochia scoparia

Lambsquarters (common)
Chenopodium album

Lettuce (prickly)
Lactuca serriola

Mustard (tansy)
Descurainia pinnata

Oats (wild)
Avena fatua

Pennycress (field)
Thlaspi arvense

Pigweed, Redroot
Amaranthus retroflexus

Pigweed (smooth)
Amaranthus hybridus

Ragweed (common)
Ambrosia artemisiifolia

Ragweed (giant)
Ambrosia trifida

Rye
Secale cereale

Ryegrass (Italian)°
Lolium multiflorum

Sandbur (field)
Cenchrus spp.

Shattercane
Sorghum bicolor

Smartweed (Pennsylvania)
Polygonum pensylvanicum

Spanishneedles°
Bidens bipinnata

Sunflower
Helianthus annuus

Thistle (Russian)
Salsola kali

Velvetleaf
Abutilon theophrasti

°Apply 3 pints of this product per acre.

Annual weeds generally will continue to germinate from seed throughout the growing season. Repeat treatments may be necessary to control later germinating weeds. Repeat treatments must be made prior to crop emergence.

CONTROL OF PERENNIAL WEEDS

Apply this product as follows to control or destroy most actively growing perennial weeds. Unless otherwise specified, allow at least 7 days after application before disturbing vegetation.

Add ¼ to ½ percent nonionic surfactant by total spray volume to the rates of this product given in this list. See the "General Information" and "Directions for Use" sections of this label for additional information.

NOTE: If weeds have been mowed or tilled, do not treat until regrowth has reached the recommended stages.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed.

When applied as recommended under the conditions described, this product WILL CONTROL the following PERENNIAL WEEDS:

Alfalfa
Medicago sativa

Alligatorweed°
Alternanthera philoxeroids

Artichoke (Jerusalem)
Helianthus tuberosus

Knapweed
Centaurea repens

Lantana
Lantana camara

Maidencane
Panicum hematomon

Bahiagrass
Paspalum notatum

Bermudagrass
Cynodon dactylon

Bindweed (field)
Convolvulus arvensis

Bluegrass (Kentucky)
Poa spp.

Brackenfern
Pteridium aquilinum

Bromegrass (smooth)
Bromus inermis

Cattail
Typha spp.

Clover (red)
Trifolium pratense

Clover (white)
Trifolium repens

Cutgrass (giant)°
Zizaniopsis miliacea

Dallisgrass
Paspalum dilatatum

Dandelion
Taraxacum officinale

Dock (curly)
Rumex crispus

Dogbane (hemp)
Apocynum cannabinum

Fescues
Festuca spp.

Guineagrass
Panicum maximum

Horsenettle
Solanum carolinense

Horseradish
Armoracia rusticana

Johnsongrass
Sorghum halepense

Kikuyugrass
Pennisetum clandestinum

Milkweed
Asclepias spp.

Muhly (wirestem)
Muhlenbergia frondosa

Mullein (common)
Verbascum thapsus

Napiergrass
Pennisetum purpureum

Nightshade (silverleaf)
Solanum elaeagnifolium

Nutsedge (purple, yellow)
Cyperus rotundus
Cyperus esculentus

Orchardgrass
Dactylis glomerata

Paragrass
Brachiaria mutica

Phragmites°°
Phragmites spp.

Quackgrass
Agropyron repens

Reed canarygrass
Phalaris arundinacea

Ryegrass (perennial)
Lolium perenne

Smartweed (swamp)
Polygonum coccineum

Spatterdock
Nuphar luteum

Texas Blueweed
Helianthus ciliaris

Thistle (Canada)
Cirsium arvense

Timothy
Phleum pratense

Torpedograss°
Panicum repens

Vaseygrass
Paspalum urvillei

Wheatgrass (western)
Agropyron smithii

°Partial control
°°Partial control in Southeastern states. See description below.

Alligatorweed — Broadcast 6 pints of this product per acre or apply a 1¼ percent solution with hand-held equipment, to provide partial control of alligatorweed. Apply when most of the plants are in bloom. Repeat applications will be required to maintain such control.

Bermudagrass — Apply 7.5 pints of this product per acre. Apply when bermudagrass is actively growing and when seed heads appear. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Brackenfern — Apply 4.5 to 6 pints of this product per acre as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment. Apply to brackenfern after fronds are at least 18 inches long.

Canada Thistle — Apply 3 to 4.5 pints of this product per acre. Apply to actively growing thistles when most are at or beyond the bud stage of growth. Fall treatments must be applied before frost. Allow 3 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Cattail — Broadcast 4½ to 7½ pints of this product per acre or apply a ¾ percent solution with hand-held equipment, providing thorough coverage. Apply when most of the plants are in bloom. For best results, apply during the summer or fall months.

Cutgrass (giant) — Broadcast 6 pints of this product per acre or apply a 1 percent solution with hand-held equipment to provide partial control of giant cutgrass. Repeat applications will be required to maintain such control, especially of vegetation partially submerged in water. Allow for substantial regrowth to the seven to ten leaf stage prior to retreatment.

Field Bindweed / Silverleaf Nightshade / Texas Blueweed — Apply 6 to 7.5 pints of this product per acre west of the Mississippi River and 4.5 to 6 pints per acre east of the Mississippi River. Apply when weed is actively growing and is at or beyond full bloom. For silverleaf nightshade, best results can be achieved when application is made after berries are formed. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Guineagrass (Panicum maximum) — Apply 4.5 pints of this product per acre or use a ¾ percent solution with hand-held equipment. Apply to actively growing guineagrass when most has reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Hemp Dogbane / Knapweed / Horseradish — Apply 6 pints of this product per acre. Apply when actively growing and most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Johnsongrass / Bromegrass (smooth) / Reed Canarygrass / Ryegrass (perennial) / Timothy / Wheatgrass (western) — Apply 3 to 4.5 pints of this product per acre. For best results, apply to actively growing plants when most have reached the boot to head stage of growth. When applying prior to the boot stage, less desirable control may be obtained. Allow johnsongrass to reach at least 18 inches average height. In the fall, apply before plants have turned brown. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Lantana — Apply this product as a ¾ to 1 percent solution using hand-held equipment only. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody state of growth.

Maidencane / Paragrass – Broadcast 6 pints of this product per acre or apply a ¾ percent solution with hand-held equipment. Repeat treatments will be required, especially to vegetation partially submerged in water. Under these conditions, allow for regrowth to the seven to ten leaf stage prior to retreatment.

Milkweed (common) – Apply 4.5 pints of this product per acre. Apply when actively growing and most of the milkweed has reached the late bud to flower stage of growth. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Nutsedge (purple, yellow) – Apply 4.5 pints of this product per acre as a broadcast spray, or apply a ¾ percent solution from hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control.

Phragmites (Southeastern States; SC, GA, AL, FL, MS, LA, TX) – Broadcast 7½ pints of this product per acre or apply a 1½ percent solution with hand-held equipment to provide partial control of Phragmites. Apply when most of the plants are in full bloom, or during the fall months. Repeat treatments will be required to maintain such control.

Phragmites (all other states) – Broadcast 6 pints of this product per acre or apply a ¾ percent solution with hand-held equipment. Repeat treatments may be required to maintain control, due to the dense growth of these species preventing thorough spray coverage.

Quackgrass / Wirestem Muhly / Kikuyugrass – Apply 3 to 4.5 pints of this product per acre. Spray when most quackgrass or wirestem muhly is at least 8 inches in height (3 or 4 leaf stage of growth) and actively growing. Do not fall plow or spring till prior to spring application. Allow 3 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Spatterdock – Broadcast 6 pints of this product per acre or apply a ¾ percent solution with hand-held equipment. Apply when most plants are in full bloom. For best results, apply during the summer or fall months.

Torpedograss (Panicum repens) – Apply 6 to 7.5 pints of this product per acre to provide partial control of torpedograss. Apply to actively growing torpedograss when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Other perennials listed on this label – Apply 4.5 to 7.5 pints of this product per acre. Apply when actively growing and most have reached early head or early bud stage of growth. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

CONTROL OF WOODY BRUSH AND TREES

When applied as recommended under the conditions described, this product CONTROLS the following woody brush plants and trees:

Alder
Alnus spp.

Berries[*]
Rubus spp.

Elderberry
Sambucus spp.

Honeysuckle
Lonicera spp.

Kudzu
Pueraria lobata

Maple[**]
Acer spp.

Oak[***]
Quercus spp.

Multiflora rose
Rosa multiflora

Poison Ivy
Rhus radicans

Poison Oak
Rhus toxicodendron

Trumpet creeper
Campsis radicans

Willow
Salix spp.

[*] Includes blackberry, dewberry and raspberry.
[**] Includes sugar maple and red maple.
[***] Includes red oak, white oak and Northern pin oak.

NOTE: Add ¼ to ½% nonionic surfactant by volume to the rates of this product given in this list. See the "General Information" and "Directions for Use" sections of this label for additional information.

If brush has been mowed or tilled or trees have been cut, do not treat until regrowth has reached the recommended stages of growth.

Ensure thorough coverage when using hand-held equipment.

Allow 7 or more days after application before tillage, mowing or removal. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Repeat treatments may be necessary to control plants regenerating from underground parts or seed.

Some autumn colors on undesirable deciduous species are acceptable provided no major leaf fall has occurred.

Apply this product as follows to control or destroy these listed plants and trees:

Alder (Alnus spp.) / Elderberry (Sambucus spp.) – Apply 4.5 to 6 pints of this product as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment.

Apply when actively growing and at or after the fall bloom stage of growth. Use the higher rate for larger plants and dense areas of growth. Best results are achieved when applied in late summer or fall prior to killing frost. Visual symptoms of control may not appear prior to frost or senescence with fall treatments.

Berries (Rubus spp.) – Apply 4.5 to 6 pints of this product per acre as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment. Apply when canes are actively growing and most are at or beyond the full bloom state of growth. Use the higher rate for plants that have reached the woody stage of growth. Best results are achieved when application is made in late summer or fall after berries are formed. Fall treatments must be applied before a killing frost. This product's activity symptoms may not occur before frost with fall treatments.

Honeysuckle (Lonicera spp.) – Apply 4.5 to 6 pints of this product per acre as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment. Apply when plants are actively growing and are at or beyond the bloom stage of growth. Use the higher rate for plants that have reached the woody stage of growth.

Kudzu (Pueraria lobata) – Apply 6 pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Apply product when vines are actively growing and most are at or beyond the early to full bloom stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost.

Maples (Acer spp.) / Oaks (Quercus spp.) – Apply as a ¾ to 1 percent solution with hand-held equipment. Apply product over top of actively growing plants. Apply when at least 50 percent of the new leaves are fully developed. Use the higher rate for large mature trees.

Multiflora Rose (Rosa multiflora) – Apply 3 pints of this product per acre as a broadcast spray or as a ¾ percent solution with hand-held equipment. Apply product when canes are actively growing and most are at or beyond the early to full bloom stage of growth. Treatments should be made prior to leaf deterioration by leaf feeding insects. Fall treatments must be applied before a killing frost. Symptoms may not occur before frost with fall treatments.

Poison Ivy (Rhus radicans) / Poison Oak (Rhus toxicodendron) – Apply 6 to 7.5 pints of this product per acre as a broadcast spray or as a 1½ percent solution with hand-held equipment. Apply when plants are actively growing at or beyond the early to full bloom stage of growth. Best results are achieved when application is made in late summer after fruit is formed. Repeat applications may be required to maintain control. Fall treatments must be applied before a killing frost and before leaves lose green color. This product's activity symptoms may not occur before frost with fall treatments. Use the higher rate for plants that have reached the woody stage of growth.

Trumpet Creeper (Campsis radicans) – Apply 3 to 4.5 pints of this product per acre as a broadcast spray or as a ¾ to 1 percent solution with hand-held equipment. Apply when vines are actively growing at or beyond the early to full bloom stage of growth. Best results are achieved when application is made in late summer or fall after fruit is formed. Fall treatments must be applied before a killing frost. This product's activity symptoms may not occur before frost with fall treatments. Use the higher rate for plants that have reached the woody stage of growth.

Willow (Salix spp.) – Apply this product as a ¾ percent solution with hand-held equipment. Apply when trees are actively growing and when foliage is full and well developed. For best results, apply in late summer or early fall. Fall treatments must be made before any fall color occurs.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

AQUATIC SITES

When applied as directed under conditions described, this product plus nonionic surfactant will control or partially control emerged annual and perennial weeds and woody brush and trees listed in this label. This product does not control plants which are either completely submerged or have a majority of the foliage under water. See the "Weeds Controlled" section of this label for rates and degree of control provided.

This product may be used in and around aquatic sites including all bodies of fresh and brackish water which may be flowing, non-flowing, or transient. This includes lakes, rivers, streams, ponds, seeps, irrigation and drainage ditches, canals, reservoirs, and similar sites. There is no restriction on the use of water for irrigation, recreation or domestic purposes.

For treatments after drawdown of water or in dry ditches, allow 7 or more days after treatment before reintroduction of water. Apply the product within one day after drawdown to ensure application to actively growing weeds.

When using this product in aquatic sites where water is present, add 1 to 2 quarts of Ortho X-77* surfactant per 100 gallons of spray solution (¼ to ½% surfactant by total spray volume).

When using this product in sites where water is not present (dry ditches, ditchbanks, dry canals), use 1 to 2 quarts of nonionic surfactant per 100 gallons of spray solution (¼ to ½% surfactant by total spray volume).

Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

NOTE: Do not apply this product within 0.5 miles upstream of potable water intakes.

Do not apply this product on rice levees when flood water is present.

Do not apply in tidewater areas.

Floating mats of vegetation may require retreatment. Avoid washoff of sprayed foliage by spray boat or recreational boat backwash or by rainfall within six hours of application. Do not retreat within 24 hours following the initial treatment.

Applications made to moving bodies of water must be made while traveling upstream to prevent concentration of the product in water. When making any bankside applications, do not overlap more than 1 foot into open water. The maximum application rate of 7½ pints per acre must not be exceeded in any single application. Do not spray across open moving bodies of water.

When emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill.

*Ortho X-77 is a trademark of Chevron Chemical Company

EPA Reg. No. 524-343

In case of emergency involving this product, Call Collect, day or night, (314) 694-4000

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MONSANTO COMPANY
AGRICULTURAL PRODUCTS
ST. LOUIS, MISSOURI 63167 U.S.A.

Glossary

ADSORPTION: Adhesion of substances to the surfaces of solids or liquids; technically, the attraction of ions of compounds to the surfaces of solids or liquids.

ADVANCING HEADCUT: An erosional process in which the vertical erosion face (headcut) moves upslope or up a drainage.

ALLEOPATHIC: Pertaining to the suppression of growth of one plant species by another through the release of toxic substances.

ALLUVIAL DEPOSITS: Deposits of sand, gravels, and cobbles resulting from the reduction in carrying capacity of flowing water. As flowing water slows, its carrying capacity drops, allowing material to settle out.

AMINE: Any of a group of chemical substances derived from ammonia in which one, two, or three hydrogen atoms have been replaced by one, two, or three hydrocarbon groups.

ANIMAL UNIT MONTH (AUM): the amount of forage needed to sustain one cow and a calf (6 months old or younger) of their equivalent for 1 month.

ANNUAL PLANT: A plant that completes its life cycle within a year.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC): An area within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes; or to protect life and safety from natural hazards.

AUTHORIZED OFFICER: A designated federal regulatory agency employee responsible for activities involving the use of public lands or delegated to exercise authority over grants for use of these lands.

BATHOLITH: A great mass of intruded igneous rock that for the most part stopped in its rise a great distance below the surface.

BETA CAMERA ANALYSIS: A method of analyzing movement of a radioactive isotope by recording on film the emittance of beta rays over a time interval.

BIENNIAL PLANT: A plant that completes its life cycle in 2 years.

BIOACCUMULATION: The accumulation of a substance in an ecoysystem. A chemical that does not bioaccumulate, decomposes rapidly in the environment.

BIOASSAY: The testing of the effects of chemical substances on live organisms under controlled conditions.

BIOLOGICAL CONTROL: The use of natural enemies to attack a target plant, retard growth, prevent regrowth, or prevent seed formation.

BOOM (HERBICIDE SPRAY): A tubular metal device that conducts a herbicide mixture from a tank to a series of spray nozzles. A boom may be mounted beneath an aircraft or behind a tractor.

BROADCAST APPLICATION: The applying of pesticide over an entire area or field rather than only to rows, beds, or individual plants. See SPOT TREATMENT.

BROWSE: That part of leaf and twig growth of shrubs, woody vines, and trees on which browsing animals can feed; to consume browse.

BUFFER (STRIP OR ZONE): A zone left untreated with herbicide (at the outer edge of a treated area or along streams) as protection against the effects of treatment.

CARBON 14 DATING: A method of dating archaeological and geological materials through the measurement of carbon 14--a heavy isotope of carbon of mass number 14.

CARCINOGENIC: A substance producing or inciting cancer.

CATEGORICAL EXCLUSION: A category of actions that do not individually or cumulatively have significant effects on the human environment and for which neither an environmental assessment nor an environmental impact statement is required.

CHEMICAL DEGRADATION: The breakdown of a chemical substance into simpler components through chemical reactions.

COLIFORM: A group of bacteria that normally abound in the intestines of humans and other warm-blooded animals and are used as an indicator of sanitary quality in water.

COLLOID: See SOIL COLLOID.

CONTACT SYSTEMIC HERBICIDE: A herbicide applied directly to a plant, which is absorbed in its leaves and then translocated throughout the plant.

CONTROL: Reduction of a pest problem to a point where it causes no significant economic damage.

CREEPING PERENNIALS: Perennial plants that spread by means of specialized modified aboveground stems (stolons) or belowground stems (rhizomes) as well as by seeds. Because of their method of spread, creeping perennial noxious weeds are the most difficult to control.

CRITICAL HABITAT: (1) Specific areas within the habitat occupied by a species at the time it is listed under the Endangered Species Act where there are physical or biological features (i) essential to the conservation of the species and (ii) that may require special management considerations or protection, and (2) specific areas outside the habitat occupied by the species at the time it is listed upon the determination by the Secretary of the Interior that such areas are essential for the conservation of the species.

CRUCIAL WILDLIFE HABITAT: An area of habitat essential to the survival of any wildlife species sometime during its life cycle.

CULTURAL RESOURCES: Remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, building, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in past human events. Cultural resources consist of (1) physical remains, (2) areas where significant human events occurred, even though evidence of the events no longer remains, and (3) the environment immediately surrounding the actual resource.

DERMATITIS: Inflamation of the skin.

DNA (DEOXYRIBONUCLEIC ACID): Any of the nucleic acids that are the molecular basis of heredity in many organisms.

DOSAGE: The regulation of doses: how often and for how long.

DOSE: The amount of chemical administered at one time.

DRIFT: The movement of airborne herbicide particles by air motion or wind away from an intended target area.

DRIP TORCH: A container of slash-burning fuel equipped with a wick to ignite the fuel mixture as it drips from the container onto the slash. Hand-held torches have a 1.5-gallon capacity and are ignited by a fiber-filled, fuel-soaked wick. The torch used by a helicopter has a 30- to 55-gallon capacity and is equipped with an electrically activated fuel pump and ignition.

ECOLOGICAL NICHE: The physical space in a habitat occupied by an organism; its functional role in a community; and its position in environmental gradients of temperature, moisture, pH, soil, and other conditions of existence.

EIS AREA: In this EIS, the five northwest states of Idaho, Montana, Oregon, Washington, and Wyoming.

ENDANGERED SPECIES: Plant or animal species that are in danger of extinction throughout all or a significant part of their range. See THREATENED SPECIES.

ENVIRONMENTAL ASSESSMENT (EA): A systematic environmental analysis of site-specific activities used to determine whether such activities would significantly affect the human environment and whether an environmental impact statement is required.

ENVIRONMENTAL IMPACT STATEMENT (EIS): An analytical document developed for use by decisionmakers to weigh the environmental consequences of a potential action.

EPHEMERAL STREAM: A stream that flows only in direct response to precipitation and whose channel is at all times above the water table.

ESTER: A substance formed by the reaction between an acid and an alcohol, usually with the elimination of water.

EXCHANGE: A transaction in which the Federal Government receives land or interests in lands in exchange for other land or interests in land.

EXOTIC PLANTS: Plants that are not native to the region in which they occur.

FATE (HERBICIDE): What happens to a herbicide after it is applied, including leaching, photodecomposition, and microbial degradation.

FETOTOXIC: Toxic to a fetus.

FOOD CHAIN: A series of plant or animals species in a community, each of which is related to the next as a source of food.

FORAGE: All browse and herbaceous foods available to grazing animals. Forage may be grazed or harvested for feeding.

FORB: A low-growing herbaceous plant that is not a grass, sedge, or rush.

GELLED GASOLINE: A slash-burning fuel mixture containing an aluminum soap of fatty acid (alumagel) and gasoline. This gelling additive is mixed with gasoline at the rate of 7 pounds per 35 gallons.

GROUND COVER: Grasses or other plants that keep soil from being blown away or washed away.

HABITAT: The environment in which an organism occurs.

HALF-LIFE: The time required for half the amount of a herbicide introduced into a living system to be eliminated or disintegrated by natural processes.

HECTARE: 10,000 square meters or about 2.47 acres.

HERBACEOUS: Having little or no woody tissue and usually persisting for a single season.

HERBICIDE: A substance used to inhibit or destroy plant growth. If its effectiveness is restricted to a specific plant or type of plant, it is called a selective herbicide. If it is effective for a broad range of plants, it is called nonselective.

HERBIVORE: An animal that exclusively eats plants.

HISTOPATHOLOGIC: Pertaining to tissue changes characteristic of diseases.

INFILTRATION: The downward entry of water into the soil.

INSULT: Injury to the body or one of its parts or something that causes or has a potential for causing such injury.

INTEGRATED PEST MANAGEMENT: Use of several techniques (for example, burning, grazing and mechanical, manual, or chemical methods) as one system to control animals or plants where they are unwanted (see BLM Manual 9220).

INTERMITTENT STREAM: A stream that flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

IN VITRO: Outside the living body and in an artificial environment.

LABEL: All written, printed, or graphic matter on or attached to pesticide containers as required by law.

LC_{50}: A lethal pesticide concentration rate at which 50 percent of test animals will be killed. It is usually used in testing of fish or other aquatic animals.

LD_{50}: The dosage of toxicant (expressed in milligrams of toxicant per kilogram of animal body weight) required to kill 50 percent of the animals in a test population when given orally.

LEACHING: The movement of chemicals through soil by water or the movement of herbicides out of leaves, stems, or roots into the air or soil.

LIVESTOCK PERFORMANCE: The gaining of weight by livestock.

LOESS: Soil material carried and deposited by the wind, consisting predominantly of silt-sized particles.

METABOLISM: The chemical processes in living cells by which new material is assimilated and energy is provided for vital processes.

METABOLITE: Any substance taking part in or produced by metabolism.

MICROBIAL DEGRADATION: The breakdown by bacteria of chemical substances into simpler components.

MICROCLIMATE: Climatic conditions characteristic of a small area. Microclimates are influenced by local geography and vegetation and may differ from regional climate in temperature, wind, length of growing season, and precipitation.

MICROGRAM: One millionth of a gram.

MOBILITY (HERBICIDE): The capability of a herbicide to be moved easily within soil, vertically or laterally, with the normal movement of water.

MULTIPLE USE: The harmonious use of land for more than one purpose, not necessarily the combination of uses that will yield the highest economic return.

MUTAGEN: A substance that tends to increase the frequency or extent of genetic mutations (changes in hereditary material).

MYONEURAL: Of or relating to both muscle and nerve.

MYOTONIA: Tonic spasm of one or more muscles or a condition characterized by such spasms.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS): The allowable concentrations of air pollutants in the air specified by the Federal Government in Title 40, Code of Federal Regulations, Part 50. The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety requisite to protect public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety requisite to protect the public welfare from any unknown or expected adverse effects of air pollutants). Welfare includes effects on soils, water, crops, vegetation, manufactured materials, animals, wildlife, weather, visibility, and climate; damage to and deterioration of property; hazards to transportation; and effects on economic values and on personal comfort and well being.

NATIONAL REGISTER OF HISTORIC PLACES: The official list, established by the Historic Preservation Act of 1966, of the nation's cultural resources worthy of preservation. The Register lists archaeological, historic, and architectural properties (districts, sites, buildings, structures, and objects) nominated for their local, state, or national significance by state and federal agencies and approved by the National Register Staff. The Register is maintained by the National Park Service.

NATIONAL TRAILS SYSTEM. A network of nationally significant trails consisting of (1) scenic, extended trails that provide outdoor recreation opportunities and conserve nationally significant scenic, historic, natural, or cultural qualities of areas through which they pass, and (2) recreation trails that provide a variety of outdoor recreation uses in or reasonably near urban areas.

NATIONAL WILD AND SCENIC RIVERS SYSTEM: A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in a free-flowing condition. This system consists of three types (1) Recreation--rivers or sections of rivers readily accessible by road or railroad that may have some development along their shorelines and that may have undergone some impoundment or diversion in the past; (2) Scenic--rivers or sections of rivers free of impoundments, with shorelines or watersheds still largely undeveloped but accessible in places by roads; and (3) Wild--rivers or sections of rivers free of impoundments and generally inaccessible except by trails, with watersheds or shorelines essentially primitive and waters unpolluted.

NEUROPATHY: An abnormal and usually degenerative state of the nervous system or nerves.

NONTARGET VEGETATION: Vegetation that is neither expected nor planned to be affected by herbicide treatment.

NO OBSERVED EFFECT LEVEL (NOEL): (1) the lowest dose of a substance by any route other than inhalation that has been found by experiment with

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animals to have no toxic effect on the animals or (2) the lowest concentration of a substance in air that has been found by experiment with animals to have no toxic effect on the animals exposed for a defined time.

NOXIOUS WEED: According to the Federal Noxious Weed Act (PL 93-629), a weed that causes disease or has other adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

ORGANOGENESIS: The formation of organs in animals.

OUTSTANDING NATURAL AREA: A natural area established to preserve scenic values and areas of natural wonder.

PALEONTOLOGY: A science dealing with life of past geological periods as known from fossils.

PARTICULATES: Finely divided solid or liquid particles in the air or in an emission, including dust, smoke fumes, mist, spray, and fog.

PATHOGEN: A specific causative agent of disease, such as a bacterium or virus.

PERENNIAL PLANT: A plant that completes its life cycle in more than 2 years.

PERENNIAL STREAM: A stream that flows continuously year round.

PERSISTENCE: The resistance of a herbicide to matabolism and environmental degradation and thus a herbicide's retention of its ability to kill plants for prolonged periods.

PESTICIDE: Any substance or mixture of substances intended for controlling insects, rodents, fungi, weeds, or other plants and animals that are considered pests.

PETIOLE: A slender stem that supports the blade of a foliage leaf.

pH: A numeric value that gives the relative acidity or alkalinity of a substance on a 0 to 14 scale with the neutral point at 7.0. Values lower than 7.0 show the presence of acids, and values greater than 7.0 show the presence of alkalis.

PHOTODECOMPOSITION (PHOTODEGRADATION): The breakdown of a substance, especially a chemical compound, into simpler components by the action of sunlight.

PHOTOSYNTHESIS: Formation of carbohydrates in the tissues of plants exposed to light.

PHYTOTOXIC: Poisonous to plants.

PRESCRIBED BURNING: The scientific, intentional burning of wildland fuels in either their natural or modified states under conditions to allow the fire to continue to a predetermined area and to produce the intensity of heat and rate of spread needed to meet certain objectives.

RADIOLABELLING: A method of creating a radioactive isotope by bombarding a particle with beta or gamma rays. This method is used to trace the movement of particles in fluids.

RAPTORS: Birds of prey, such as owls, hawks, or eagles.

RESEARCH NATURAL AREA: A physical or biological unit in which current natural conditions are maintained insofar as possible. In such areas, activities such as grazing and vegetation manipulation are prohibited unless they replace natural processes and contribute to the protection and preservation of an area. Such recreation activities as camping and gathering plants are discouraged.

RHIZOME: An underground root-like stem, that produces roots and leafy shoots and provides a means for some plants to reproduce.

RIPARIAN: Pertaining to or located along a streambank or other water bodies, such as ponds, lakes, reservoirs, or marshes.

RISK: The probability that a substance will produce harm under specified conditions.

ROSETTE: A cluster of leaves in crowded circles or spirals arising basally from a crown or apically from an axis with greatly shortened internodes.

RUNOFF: The part of the precipitation in a drainage area that is discharged from the area in stream channels, including surface runoff, ground water runoff, and seepage.

SCOPING: The process by which significant issues relating to a proposal are identified for environmental analysis. Scoping includes eliciting public comment on the proposal, evaluating concerns, and developing alternatives for consideration.

SEDIMENTATION: The process or action of depositing sediment.

SENSITIVE SPECIES (PLANTS): Plant species not officially listed as threatened or endangered but that are undergoing a status review or are proposed for listing by either Federal Register notices published by the Secretary of the Interior or the Secretary of Commerce or by comparable state documents.

SOIL COMPACTION: The compression of the soil profile from surface pressure, resulting in reduced air space, lower water-holding capacity, and decreased plant root penetrability.

SOIL COLLOID: An extremely small particle of clay or organic matter that exposes a large surface area on which some herbicides are absorbed.

SOIL PRODUCTIVITY: The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

SOIL PROFILE: A vertical section of soil that shows all horizons and parent material.

SORPTION: The process of taking up or holding by either absorption or adsorption.

SPOT TREATMENT: Applying pesticide to a selected individual area as opposed to broadcast application.

STATE HISTORIC PRESERVATION OFFICER (SHPO): The official within each state authorized by the state at the request of the Secretary of the Interior to act as liaison for implementing the National Historic Preservation Act of 1966.

STREAM CLASSES: Four classes of streams defined by present and foreseeable uses made of the water and potential effects of onsite changes on downstream uses. Because importance of use is relative to the general area, size is not necessarily a criterion for classification. Whole streams of parts of streams can be classified, and one stream may have sections in different classes.

Class I - Perennial or intermittent streams or segments that have one or more of the following characteristics: (1) are a direct source of water for domestic use (cities, recreation sites); (2) are used by large numbers of fish for spawning, rearing, or migration; (3) have enough water flow to greatly influence water quality of a Class I stream.

Class II - Perennial or intermittent streams or segments that have one or both of the following characteristics: (1) are used by moderate though significant numbers of fish for spawning, rearing, or migration; (2) have enough water flow to have only a moderate and not a clearly identifiable influence on downstream quality of a Class I stream or have a major influence on a Class I stream.

Class III - All other perennial streams or segments not meeting higher class criteria.

Class IV - All other intermittent streams or segments not meeting higher class criteria.

SUSPENDED SEDIMENT: Very fine soil particles that for long periods of time are maintained in suspension in water by turbulent currents or as colloids.

SUSTAINED YIELD: Achieving and maintaining a permanently high level, annual or regular period production of renewable land resources without impairing the productivity of the land and its environmental values.

TERATOGEN: A substance tending to cause development malformations in unborn human or animal offspring.

TERATOGENESIS: Birth defects.

THREATENED SPECIES: Plant or animal species that are not in danger of extinction but are likely to become so within the foreseeable future throughout all or a significant portion of their range. See ENDANGERED SPECIES.

TISSUE BURDEN: The cumulative effects of a substance on a particular tissue.

TOLERANCE: Acceptable level of pesticide residues.

TOTAL DISSOLVED SOLIDS (TDS): An aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, and nitrates of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts. High TDS solutions can change the chemical nature of water, exert varying degrees of osmotic pressures, and often become lethal to life in an aquatic environment.

TRANSLOCATION: The transfer of substances from one location to another in the plant body.

TUMORIGENIC: Causing tumors.

UNDERSTORY VEGETATION: Plants, usually grasses, forbs, and low shrubs, growing beneath the canopy of other plants.

UNGULATES: Hoofed mammals, most of which are herbivores and many of which have horns.

VAPOR PRESSURE: The pressure at which a chemical compound will evaporate.

VASCULAR PLANT: A plant that has a specialized conducting system consisting of xylem and phloem.

VISUAL INTRUSION: A feature (land, vegetation, structure) that is generally considered out of context with the characteristic landscape.

VISUAL RESOURCE MANAGEMENT (VRM): The planning, design, and implementing of management objectives to provide acceptable levels of visual impacts for all resource management activities.

VISUAL RESOURCE MANAGEMENT CLASS (VRM CLASS): The degree of visual change acceptable within the existing characteristic landscape. An area's classification is based upon the physical and sociological characteristics of any given homogeneous area and serves as a management objective. Class I (preservation) provides the highest level of protection for scenic values, and Class IV the lowest level.

WATER TABLE: The upper limit of the part of the soil or underlying rock material that is wholly saturated with water.

WATSTORE: WATer STOrage and REtrieval–a computer program created and maintained by the U.S. Geological Survey for storing, retrieving, and manipulating water quality data.

WEED: A plant out of place or growing where not desired.

WEED-INFESTED ACRE: Any part of an acre of land that is infested with weeds.

WILDERNESS: An area designated by Congress as part of the National Wilderness Preservation System. Wilderness areas are generally undeveloped federal lands that retain their primeval character and influence without improvements or human habitation.

WILDERNESS STUDY AREA (WSA): A roadless area that has been found to have wilderness characteristics and that is being subjected to intensive analysis in the BLM planning system and to public review to determine wilderness suitability.

[illegible]

SENSITIVE SPECIES [illegible]

SOIL COMPACTION: [illegible]

SOIL COLLOID: [illegible] of organic matter [illegible]

SOIL PRODUCTIVITY: The capacity of a soil in its normal environment to produce a specified plant or sequence of plants under a specified system of management.

SOIL PROFILE: A vertical section of the soil [illegible] parent material.

SORPTION: The process of taking [illegible] either absorption or adsorption.

SPOT TREATMENT: [illegible]

[illegible]

STREAM [illegible]

[illegible]

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Abbreviations

ai: active ingredient
BLM: U.S. Department of the Interior, Bureau of Land Management
BPA: U.S. Department of Energy, Bonneville Power Administration
CEQ: Council on Environmental Quality
CFR: Code of Federal Regulations
DOE: U.S. Department of Energy
EIS: environmental impact statement
EPA: U.S. Environmental Protection Agency
FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act
FS: U.S. Department of Agriculture, Forest Service
ha: hectare
kg: kilogram
m: meter
mg: milligram
MOS: margin of safety
mph: miles per hour
NEPA: National Environmental Policy Act
NCI: National Cancer Institute
NOEL: no observed effect level
NRCC: National Research Council of Canada
ppm: parts per million
ppb: parts per billion
SCS: U.S. Department of Agriculture, Soil Conservation Service
USDA: U.S. Department of Agriculture
USDI: U.S. Department of the Interior
VRM: visual resource management
WSA: wilderness study area

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